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Contractors and Engineers Monthly

Vol. 43, No. 7 JULY, 1946 $3 a Year, 25 Cents a Copy

Covering the Field

- **Highway Grading**
  The big road-construction program ahead involves considerable grading. Moving 680,000 yards, much of it hard clay, for a 9.2-mile reinforced-concrete pavement is described on this page. For a 5.7-mile section of a new expressway, 920,000 yards of excavation was required (page 51).
- **Equipment Shop**
  Well equipped and attractive shops are an asset to any highway department. A description of one such shop appears on this page, while pictures tell the story on pages 44 and 45.
- **County Road Work**
  Road-mix for resurfacing county roads is described on page 1, while the work of a rural-county highway department is covered on page 64.
- **Special Machines for Canal**
  The feature of a contract for an 11-mile section of the Coachella Branch of the All-American Canal was the use of specially built machines for grading and lining the canal with concrete. See page 2.
- **Foundation Construction**
  Post-war building brings back to the construction scene a considerable amount of foundation work. One such job is described on page 6.
- **Base for Airport Runways**
  A contract for temporary runways for the new East Boston, Mass., Airport included grading and base for the permanent runways. See page 9.
- **Structures for New Route**
  The construction of a long culvert and two grade separations was involved in a 1½-mile section of new dual highway. See page 14.
- **Dredging for River Control**
  The dredge John S. Campbell and its work in cutting a pilot canal to aid in control of the Missouri River are the subject of an article on page 31.
- **Portrait in Print**
  An exclusive story highlighting the career of Frank Crowe, world-renowned dam builder, appears on page 33.
- **Levee Construction**
  A new set-back levee 4.8 miles long and requiring 1,780,000 yards, was built by tractor-scrapers and by dragline loading to rubber-tired wagons. See page 41.
- **Highway Maintenance**
  Population shifts have created highway problems in many states. Road maintenance in the face of a traffic boom is discussed on page 46.
- **Bituminous Paving**
  In addition to the road-mix article on page 1, a hot-mix resurfacing contract on an old widened highway in New England is described on page 70.

(You will find "In This Issue" on page 4)

Scrapers Move Brick-Hard Clay

Daily Average Is 12,000 Yards on Grading for 9.2 Miles of 24-Foot Concrete Road; Total 680,000 Yards

By HOWARD V. PEHRSON,
Central States Field Editor

✦ SCRAPERS working in brick-hard clay, which was compacted so firmly in some cuts that it had to be scarified before it could be scooped, averaged over 12,000 cubic yards of excavation a day on a job this spring. S. J. Groves & Sons Co. of Minneapolis did the work. The job entailed moving 680,000 yards of dirt to provide the stabilized subgrade for 9.2 miles of new reinforced-concrete paving in eastern Illinois.

The project, FAP 70A (1), Section 2-2,3-2, relocates U. S. 50 between Lawrenceville and Sumner. It will replace the narrow, traffic-congested, old paved road with a concrete highway 24 feet wide on this busy route through the heart of the Illinois oil country. The contract for the entire project was awarded last autumn by the Illinois Division of Highways to the Harrison Engineering & Construction Corp., Kansas City, Mo., on its low bid of $986,000. This company arranged with S. J. Groves & Sons to handle the grading and to place the granular borrow in preparation for paving.

On October 15, crews moved onto the job site and started clearing and grubbing the right-of-way. Some 360 acres were cleared in preparation for grading; these included 125 acres of light-to-heavy growth and 30 acres of heavy tree removal. In this densely wooded section, elm, beech, soft maple, hickory,

(Continued on page 22)

C. & E. M. Photos

S. J. Groves & Sons Co. used both Carryalls hauled by D8's and Tournapulls on a 9.2-mile grading job in tough clay. At right, A. J. McKay, Construction Superintendent for Groves, is on the left, with I. C. Bliss, Resident Engineer for the State.

Highway Shop

Appearance and Utility Are Combined in District Shop Which Does Efficient Work

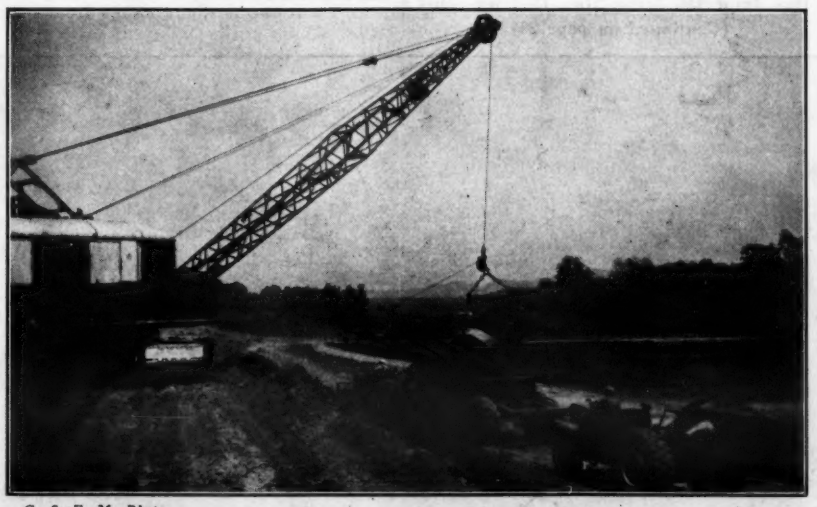
(See photos on pages 44 and 45)

✦ THAT highway maintenance shops can have a pleasing appearance and still handle efficiently a large volume of work is well illustrated in the New York State Department of Public Work's District 10 shop at Babylon, Long Island. There 124 pieces of motor-driven equipment are maintained in light, cheerful surroundings by a small crew of skilled workmen. The shop occupies a 4-acre tract of land at the corner of Montauk Highway and Little East Neck Road. It is within the village limits of Babylon, which is on the south shore of Long Island about 40 miles from New York City. District 10 headquarters consists of three attractive buildings of related design.

At the northeast corner of the intersecting roads is the office of the District Engineer, a modified L-shaped 2-story

(Continued on page 73)

NEW 4.8-MILE LEVEE TO CHECK FLOODS



C. & E. M. Photo

On the R. B. Potashnick contract for a new levee along the Big Muddy River in Illinois, the contractor used a Lima 802 dragline with a 50-foot boom and a Hendrix 2-yard perforated bucket to handle the heavy black gumbo. The material was loaded to Caterpillar 8-yard wagons for hauls of about 750 feet. See page 41.

County Repaves With Road-Mix

Methods and Costs of 24-Foot Black-Top Paving On 11,880-Foot Project; Road-Mixer Used

✦ THE most advanced type of road construction being done in San Bernardino County, Calif., is the laying of black-top paving 24 feet wide on a prepared subgrade, with the help of self-powered road-mixers. Such a job was recently finished on Slover Avenue between Cedar and Sierra Streets, a distance of 11,880 linear feet, in the town of Bloomington.

The old pavement was a dust-oil mix about 1 inch thick and 16 feet wide, which had been in place 18 years. It was weathered and pocked; holes had appeared in the subgrade. The old street had not been laid out to any special elevation, so it wandered in undulating waves with the topography.

Preliminary Work

A new roadway 30 feet wide shoulder to shoulder was staked by a county survey party, and blue tops set for a level grade. The heaviest cut section was about 4 feet, so this was excavated by a Caterpillar tractor and a Wooldridge 12-yard scraper. An Allis-Chalmers Model HD-10 bulldozer was also used. All light grading was done by an Adams 511 motor grader. The old topping was too far gone to be worked in to the new surface, so it was buried in the roadbed in the grading

(Continued on page 79)

New Irrigation Canal Built With Specialized Machines

100-Foot Cuts Are Made To Advance Life-Giving Water Another 11 Miles Towards Thirsty Acres

By RAYMOND P. DAY,
Western Field Editor

✦ THE Coachella Branch of the All-American Canal has been advanced another 11 miles towards 75,000 potentially irrigable acres near Indio, Calif. The work began in October, 1944, under a contract awarded by the U. S. Bureau of Reclamation to the J. F. Shea Co. of Los Angeles. But in another and truer sense, this work began almost a hundred years ago, in 1849—during a doctor's vacation which was spent in Yuma, Arizona.

History of a Valley

Dr. Oliver Wozencraft, and a little long-eared stubborn burro he had bought, were bent on exploring the California desert west of Yuma. As they ferried across the mighty Colorado River, the doctor marveled at its wealth of water in this arid desert. As they loafed along in the shimmering summer heat, the visionary doctor no longer saw the miles of sterile desert around him and under the burro's hoofs. He saw, instead, a land blooming and producing crops. For he dreamed that water from the Colorado had been trained towards its acres.

Nor was Dr. Wozencraft content only to dream. For three following summers he came back to the desert, combing the valley, hiring surveyors, and paying their wages out of his personal funds. When he took his project to the foremost engineers of the day, they laughed at him. He went to Washington. Washington referred him back to the engineers. Everywhere, indifference from public officials—except from one obscure county engineer named Ebenezer Hadley, who, after all, could do nothing to help him or to dispute governmental findings. Dr. Wozencraft neglected his San Francisco medical practice. He drove himself harder and harder. And he soon died, impoverished and ridiculed, a great man three quarters of a century ahead of his time.

His idea, however, did not die. Charles Robinson Rockwood and A. H. Heber, who were operating privately for an irrigation company, kept it alive through the roaring eighties. Though Army Engineers surveyed and reported the project unfeasible in 1876, private interests took the first step in 1901. They brought the Colorado River water through a natural sink in northern Mexico, over the border into the Imperial Valley. The doctor's desert began to bloom.

In 1934 the U. S. Bureau of Reclamation began the largest man-made river in the world, the All-American Canal. So called because all of it was in the United States, it had an initial capacity of 15,155 cfs. But what was more important for our story—just 18 miles upstream from Yuma, exactly where Dr. Wozencraft would have wanted it, Imperial Dam was thrown across the Colorado River in 1938, to turn its water into the canal.

C. & E. M. Photo
A Northwest 2½-cubic-yard shovel loads a bottom-dump Euclid, which will then climb a ramp in order to deposit its load on a protective levee.

The Coachella Branch of the All-American Canal was begun in 1938, and 86 miles of it was completed under prior contracts before the recent job was let. Its capacity at the turnout is 2,500 second-feet. Because of anticipated future deliveries to East Mesa lands of the Imperial Irrigation District, this

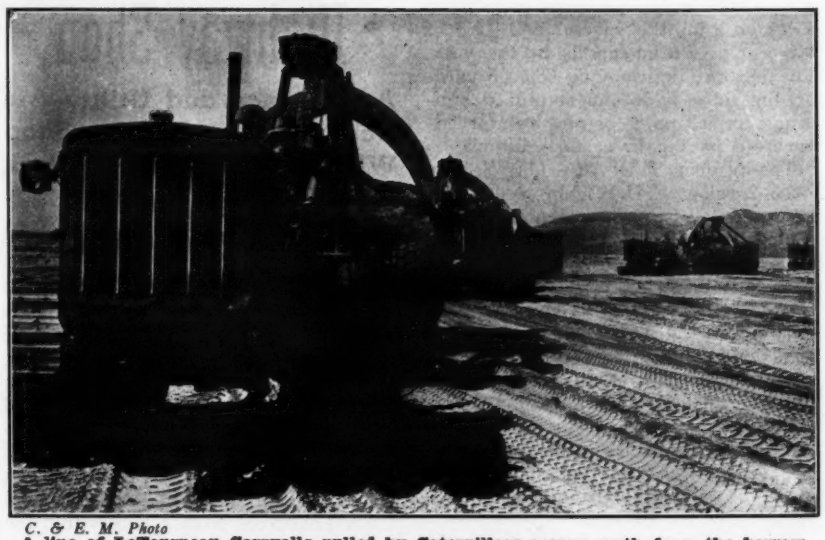
(*Continued on page* 26)

Fine-Grading the Canal And Pouring Concrete Lining Hurried Along By Special Equipment

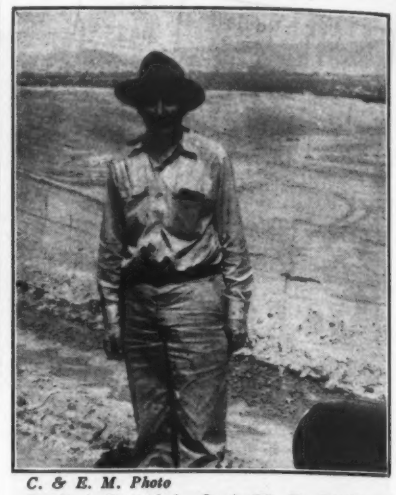
✦ TWO special machines for use on an 11-mile section of the All-American Canal were built for the J. F. Shea Co. by the Wood Mfg. Co. One of these machines was for fine-grading the excavated canal sides and bottom, and the other for pouring the 3½-inch concrete slab on 1½ to 1 slopes and floor. Their construction—and later their alteration under the direction of Superintendent Rennebohm—made it possible to pour up to 500 linear feet of concrete lining per day.

Lining the canal with a concrete slab prevents the loss of irrigation water through seepage. Such conservation measures are necessary now, for every drop is earmarked. The west is rapidly approaching a point where even the water from the Colorado River will not be enough to meet all the state and international needs.

The two special machines were wheel-mounted, and built to ride along a single rail on either side of the canal. These rails were laid by a labor crew of seven men and a Browning truck crane. The rails were placed in 30-foot sections on 4 x 12-inch ties, and fastened with four ¾-inch bolts. Ties were spaced on 24-inch centers. The distance from one rail to the other measured exactly 52 feet.



C. & E. M. Photo
A line of LeTourneau Carryalls pulled by Caterpillars moves earth from the borrow pit to build a protective levee north of the canal.



C. & E. M. Photo
Project Superintendent W. F. Rennebohm stops for the camera on top of the protective dike on the J. F. Shea contract for an 11-mile section of the Coachella branch of the All-American Canal in California.

Special Fine-Grader

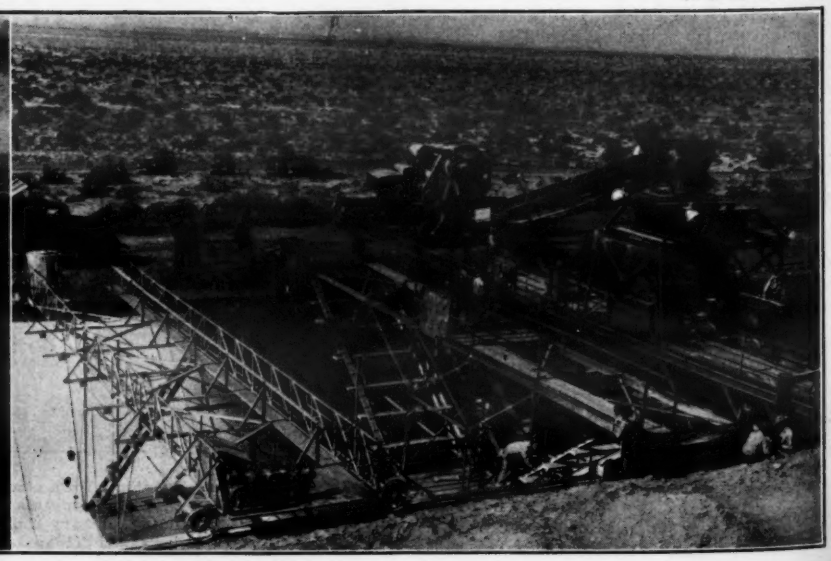
The Wood-manufactured fine-grader was driven by electricity, which was furnished by a 90-kw Electric Machinery Mfg. Co. generator driven by a Murphy diesel engine. In principle, this grader was a composite arrangement of endless buckets, set on the proper slopes. Hydraulic jacks in the frame of the machine were used to raise or lower the bucket chain, which scraped the bottom and side slopes of the new canal. Both side chains for sloping were also adjustable. Digging buckets were driven by a Fairbanks-Morse 20-hp motor, delta connected, through a Falk reduction gear and drive chain.

All digging buckets were fitted with three H & L detachable teeth on the cutting side. These teeth were used until worn, and then discarded. New H & L teeth were installed by one or two blows of a ball-peen hammer.

The machine moved forward on the rails by means of a drive sprocket, which was geared through an American speed-reduction unit to a 2-hp Wagner electric motor. One of these drives was located on each rail, and was sufficient to move the machine ahead without any other help. Excavated material was carried to a main conveyor belt and dumped outboard on the lower side of the canal.

In any special machine of this type there are usually a certain number of "bugs" which have to be ironed out before the machine is 100 per cent adaptable to the job. This was no exception. A clutch had to be installed on each driving motor and gear assembly so that one set of wheels could be ro-

(*Continued on page* 59)



Left, in the background, is seen the fine-grader specially built by Wood Mfg. Co. for grading the canal sides and slopes. In the foreground, the steel reinforcing is in place, while a laborer trims the top of the slope in preparation for concrete placing. Another Wood specially built machine was used for lining the canal with concrete. It is seen at the extreme right. Next to it is the joint-cutting machine with finishing platforms, and at the left, the bridge from which the curing compound was applied.

C. & E. M. Photos

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Texaco Asphalt Macadam (penetration type) was used in paving runways of this Connecticut airport.

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Contractors and Engineers Monthly

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William H. Quirk, Editor and Eastern Field Editor
Howard V. Pehrson, Central States Field Editor
Raymond P. Day, Western Field Editor
Olive E. Potter, Managing Editor
John P. Flynn, New Products Editor

Edgar J. Buttenheim, President
George S. Conover, Vice President
Edwin Wagner, Secretary and Treasurer
Donald V. Buttenheim, General Manager
Myron MacLeod, Advertising Manager
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Safety on Construction Jobs

Unlike the weather about which everyone talks but nobody does anything, as Mark Twain once said, the matter of safety on a construction job is a topic that *should* be discussed. It should be talked about continually in order to make all concerned safety-conscious. Only in that way will something be done about it. Only in that way can the construction industry better its poor record of job safety.

Of course, no one wants accidents. They bring pain, sorrow, and tragedy to the ones immediately concerned. They bring the expense of time lost from work, together with the likelihood that compensation-insurance rates will increase in view of a bad accident record.

Some say accidents are inevitable—that every big job is bound to take its toll in injuries and deaths. Safety-minded superintendents and engineers deny this emphatically and point to many a record of heavy-construction projects devoid of serious accidents. They can and do take just pride in this accomplishment. It is brought about only by their infinite capacity for watchful care in preventing the incidents which lead to the accidents.

They are the men or the companies which insist on a clean-appearing job. They believe that if everything is in order, confusion and mental hazards are less likely to arise in emergencies. They use safety posters constantly to impress the worker with a "be careful" message. They see that he is properly equipped with the right gear for his job.

They make workers on the water wear life jackets. They require hard hats in locations where objects are apt to fall from above. They insist on safety shoes where the feet are exposed to possible rough treatment. They make available modern glasses and face shields for welding, burning, or grinding operations. They see that pure drinking water is on hand and dispensed in a sanitary manner. By thinking and guarding against every possible eventuality, these safety-minded job bosses keep their men fit and well, the project running along smoothly.

One big construction company has found that good results are obtained by giving wide publicity to its accidents in a monthly safety bulletin. Every accident is described in detail, even to the names of those involved. And a sentence or two at the end of the article suggests how the accident might have been prevented.

Unfortunately, the personal equation is something that is unpredictable. On a big job a few weeks ago, for instance, what caused a worker to stand beneath a 55-foot crane boom as it was being lowered for a reeving change is one of the imponderables of fate. The same operation had been taking place many times a day without incident until this once, when the cable slipped, crashing the boom to earth with the worker beneath it. The man, for the sake of the record, was a discharged veteran with three years of overseas service and several battle stars to his credit.

Vigilance, eternal vigilance, is required by *everyone* on the job, including the workers themselves, to make job safety a fact and not merely a slogan.

No Housing for the Builders

The housing shortage is not confined to the large towns and cities of this country. It extends into the highways and byways of the hinterlands. There it poses a problem for the job superintendent and resident engineer—where can I live during work on this construction project? Time was when the superintendent or engineer could always find an empty house to rent at a reasonable figure, in some little community not far from where he was building a road, bridge, airport, or dam. Now it is practically impossible even in the most remote town or village for these men to find a place to live. The workers, if they are recruited from the surrounding territory, live at home, but the superintendent or engineer must find his own lodging.

Some of this supervising group have been discovered living in trailers set up near their project, after they have made arrangements with perhaps a farmer for occupying space on his land, obtaining water, and tapping his electric line. Not all the trailers, however, are so modernly outfitted with wiring; some are lit by oil lamps or even candles. In appearance they range all the way from sumptuous to shabby, for trailers, like everything else, are scarce, and many of those available are so old and battered that they resemble slums on wheels.

Many of the junior engineers or inspectors, whose pay is not large to begin with, are victims of the hotel or boarding-house squeeze. Hotels do not care to give monthly rates to such men, since they can do better by renting their rooms by the day. And the old-time boarding house is about as extinct as the dodo, since food shortages discourage folks from taking in boarders. As a result, the young field men must choose between paying high daily rates at a small hotel and eating in restaurants, or squatting down somewhere and doing their own housekeeping. Either arrangement leaves much to be desired.

On one job a young ex-G.I., now a junior highway-department inspector, was found roughing it in a small shack near the bridge he was helping to build. He slept in a bunk and cooked his meals over a small wood stove. Due to the meat shortage, he had fallen back on that ersatz ham which had been one of the banes of his army life. To him, a returned veteran, the picture was not exactly rosy—low pay, rough housing, and unappetizing meals. But still, the birds sang clearly in the trees around his "home" and the air was clean.

That he and others like him carry on at their jobs bespeaks a feeling for construction that overshadows the annoyances of their own personal maintenance problems. Uncredited and unsung, they find their reward in doing their job well.

WAA Surplus-Disposal Policies Are Criticized

Policies of the War Assets Administration in disposing of surplus property were raked vigorously over the coals last month at a meeting in Washington, D. C. Its participants were officials of national associations representing the heavy-machinery, truck, tire, farm-equipment, automobile, hardware, and other industries. E. P. Phillips, Chairman of the Associated Equipment Distributors Committee on Disposal of Government Surplus, presided.

The speakers' complaints were specific. WAA officials fail to think in terms of first things first. There is no uniformity of operations in regional offices. Items desperately needed for industrial and commercial construction and road building are hidden away in storehouses and supply depots in various parts of the country. Plans for salvaging millions of feet of lumber from surplus military establishments are still in the discussion stage. Dealers and distributors go to expense and trouble to attend large surplus-property sales. But often they find that most of the advertised critical items have been withdrawn by the WAA.

Discussions at the meeting reflected impatience, dissatisfaction, and discouragement with what was called an "intolerable situation", rather than any doubt as to the motives and sincerity of WAA officials. They reflected the desire for more realistic, vigorous, forthright policies by administrators of the Surplus Act—or by Congress in a re-examination of the Act.

Officials who participated in the meeting are now holding conferences within their respective industries. These are preliminary to a proposed conference of all trade associations interested in surplus property, to be held soon in Washington. This conference will try to work out a cooperative and constructive approach to the problem.

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ASTM Issues Supplement To Book of Standards

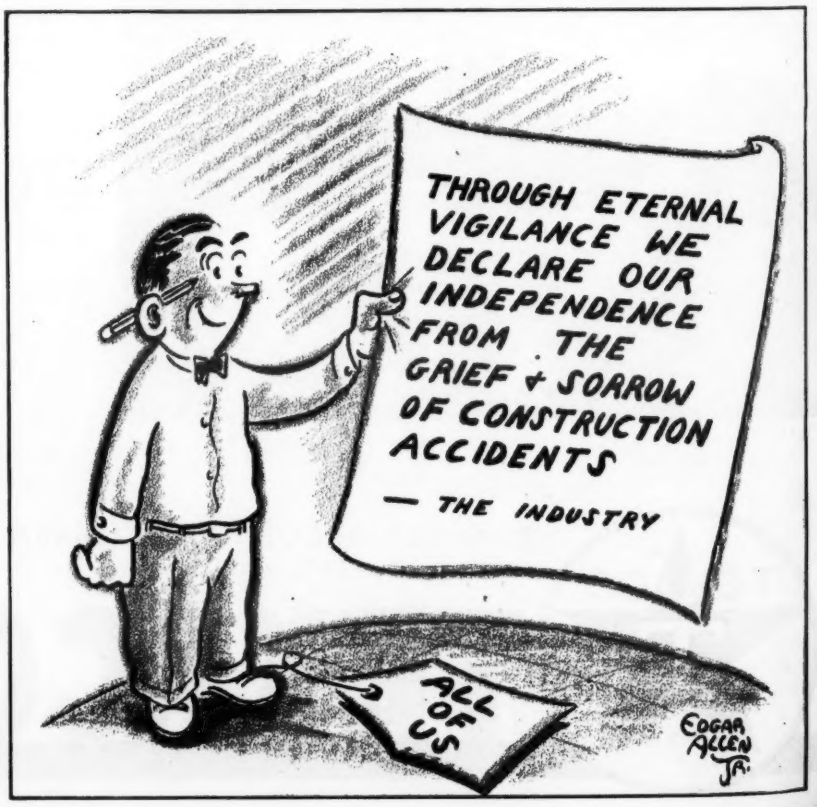
Bringing the 1944 edition of the "Book of ASTM Standards" up to date, the American Society for Testing Materials has announced the publication of a three-part supplement. Each a volume in itself, the supplements present in their latest approved form some 230 specifications, tests, and definitions issued for the first time in 1945, or revised since the 1944 book was published.

Copies of the supplements, bound in cloth to match the parent volume, can be obtained at $4 per part from the Society at 1916 Race St., Philadelphia 3, Pa. Heavy leather bindings are available at extra cost.

Covered Spans Still Stand

Scattered through Indiana are 193½ covered bridges—holdovers from so-called happier and more romantic days. Of the state's 92 counties, 41 still have such structures, 95 per cent of which are reported in good condition. The "half" bridge is the West College Corner span which straddles the Indiana-Ohio boundary. It is shared by Union County, Ind., and Preble County, Ohio.

DECLARATION OF INDEPENDENCE—1946 STYLE!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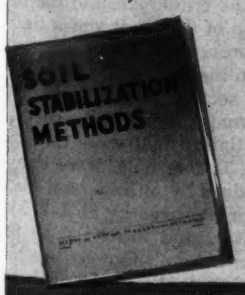

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Foundation Excavated In Red Clay and Shale

Deep Shaft and Tunnel Tie Into City Sewer; Timber Cribbing Prevents Slides; Piers Rest on Rock

By WILLIAM H. QUIRK,
Editor

✦ PREPARING a foundation for the large new building now under construction at the Hartford Hospital was an exacting job. It required a combination of speed and utmost precaution to prevent damage to the neighboring hospital buildings or impairment of their normal use. The sorely needed addition to the big hospital in the heart of Connecticut's capital city was postponed because of the war. But a contract for it was awarded to the George A. Fuller Co. of New York City soon after the end of hostilities. A subcontract to dig the foundation for this brick-and-steel 320 x 180-foot 13-story building, with three additional floors in the tower, was given to E. B. McGurk, Inc., of Hartford. This work also included laying the necessary storm and sanitary-sewer connections from the building to the existing city mains.

The numerous buildings comprising this hospital institution are of varied age. When the new one, called the High Building, is completed some time in 1947, several of the older ones will be razed since they will be needed no longer. At the south end, the new building abuts on the existing maternity wing, which was built just prior to the war. The combined length of the two adjoining buildings is 460 feet; they are 180 feet wide. Connections will be made between the two structures, which have similar architectural features although the older building is but five stories high.

Preliminary work on the new $6,500,000 addition, which cost includes equipment, began early in September, 1944. The contractor laid 200 feet of temporary 16-foot macadam ambulance drives, with a 4-inch stone base and a 3-inch top. These were necessary because the original drives and parking lot occupied an area which was soon to be under construction. So also did twelve 2 and 3-story brick dwellings on the west side of the property along Seymour Street. The New England Wrecking Co. of Springfield, Mass., tore down these buildings to make room for a new parking lot, which will be laid out along with the new entrance drives after the building is completed.

C. & E. M. Photo
A Marion 331 crane with a Haiss ¾-yard clamshell excavates trench for the sewer lines on the E. B. McGurk subcontract for the foundation of an addition to the Hartford Hospital.

Before excavation could begin, several pipe lines servicing the hospital had to be shifted. They were within the digging lines of the 330 x 200-foot hole which went down to an average depth of 20 feet. A 40 x 60-foot pit was dug 12 feet below this level for elevator foundations. Additional cuts also had to be made for tunnels to contain the elaborate system of pipes and conduits incidental to all big buildings and especially to hospitals. These open cuts, averaging 12 feet in width, crisscrossed the bottom of the excavation at an additional depth of 6 feet.

Foundation Excavation

The total excavation amounted to about 40,000 yards, comprising 29,500 yards of red clay and the remainder a shale rock. Digging was started at the north end of the site near Jefferson Street where the material was all clay. A Keystone 1-yard trench hoe excavated a ramp on a gentle slope, 200 feet long x 25 feet wide. This heavily used access road into the hole was covered with stone from the old parking field to give a good surface to the clay beneath.

C. & E. M. Photo
The foundation for an addition to the Hartford, Conn., Hospital was excavated in red clay and shale. A Northwest shovel loads a truck in the center. At the right is the crane and clamshell which handled the backfill for the crib wall.

This was a wise move since the haul road would otherwise have been impassable in wet weather. Despite the usual heavy autumn rain, only 1½ days were lost because of weather in the three months of September, October, and November during the excavation work. If the clay became too slippery to handle during a wet spell, enough rock was present to keep the excavation crew busy.

Ranging in depth from 0 to 12 feet, the rock was encountered mostly in the western half of the site. Where the stratum was 12 feet the procedure was to remove it in two 6-foot layers. Holes were drilled on an average of 4-foot centers by four Ingersoll-Rand Jackhamers, using 1-inch steel and bits from 2 to 1½ inches in size. Holes were started with 4-foot lengths of steel, and when this depth was reached a shift was made to the 6-foot length. Since hospital buildings stood on both sides of the hole, the blasting naturally had to be done in small charges without trying to take out too much rock at one time. Never more than four holes were shot at once; from 2½ to 4 sticks of American 40 per cent dynamite were used per hole. When blasting was required alongside the maternity-ward building, this charge was further reduced to ½ stick per hole to safeguard the existing foundation. Air for the drilling equipment was supplied by three Ingersoll-Rand compressors, two 315-cfm and one 105-cfm. The charge was contained by covering the blasting area with 12 x 12-foot woven-wire mats.

The material was excavated by a Northwest 1½-yard shovel, assisted at times by a Link-Belt shovel of the same size, which loaded a fleet of 5-yard trucks for hauling the clay or rock away. At the peak of the digging, 20 units were in use, 14 Internationals and 6 Macks. These hauled the material ½ mile to a 5-acre private dump adjoining the Hartford municipal dumping grounds. D. L. Cummings of Hartford had a subcontract to haul the dirt at a given price per yard, and he in turn rented the trucks (the Mack trucks he rented from McGurk who had the excavation contract). At the dump a Caterpillar RD2 tractor-dozer leveled off the dumped material. All excavation was not taken to the dump, however, as some had to be stockpiled at the site for later use as backfill. About 4,000 yards was heaped up at one end of the site for this purpose; 2,000 yards of bank-run gravel was brought in later and placed alongside the concrete foundation walls. Each shovel averaged about 1,200 yards of excavation in an 8-hour day; the rock removal progressed at the rate of about 600 yards a day.

Crib Wall

At the east side of the site the excavation line was very close to some of the older hospital buildings, and only 4 feet from the sidewalk running in front of these stone structures. Next to the walk, on the side towards the hole, ran an 8-inch water main. It was 5 feet deep in the ground, and it carries the entire water supply for the hospital. To prevent this bank from sliding or caving in with almost certain disruption of the water supply, timber cribbing was erected for a length of 210 feet and to a height of 15 feet. As the digging progressed to the vicinity of this danger zone, only about 25 linear feet of excavation was made to the neat lines at one time, and cribbing was immediately erected in this area. The precautions were well taken, for no trouble was experienced with slides, and the hospital facilities were uninterrupted.

For greater stability the crib wall was built with a 14-inch pitch, sloping away from the hole back towards the bank. This slope was shaped in the ground on which the cribbing was to rest, so that the same angle could be held throughout the full wall height. The crib wall was 8½ feet wide and was made up of 9 x 7-inch timbers. For the lower three courses, three timbers were laid lengthwise of the wall for each tier, while the courses above had only two timbers, one at the front and the other at the back of the wall. For anchorage the lower tier was set in a trench dug in the clay. If rock was encountered during the digging, 2-foot holes were drilled and 2½-foot steel dowels inserted in them so that the 6 inches projecting prevented any movement of the timbers.

Cross timbers were placed at alternate 6 and 4-foot spacing and projected out about 1 foot beyond the longitudinal members. At all such cross points 9 x 6-inch wooden cleats, 2 inches thick, were nailed on both the bottom and top of the lateral members. These checked any possible tendency for the wall to slip because of the earth pressure behind it. The crib wall, 15 tiers high, was stabilized still further as it went up by backfilling with dirt placed by a Bucyrus-Erie crane using a 40-foot boom and a ⅝-yard clamshell bucket. The cribbing was left in until after the concrete foundation wall was poured, 6 feet in from the toe of the timber crib. During all the construction it served too as an important safety measure for the men working in the foundation hole.

C. & E. M. Photo
Backfill for the timber cribbing was placed by a Bucyrus-Erie crane and ⅝-yard clamshell.

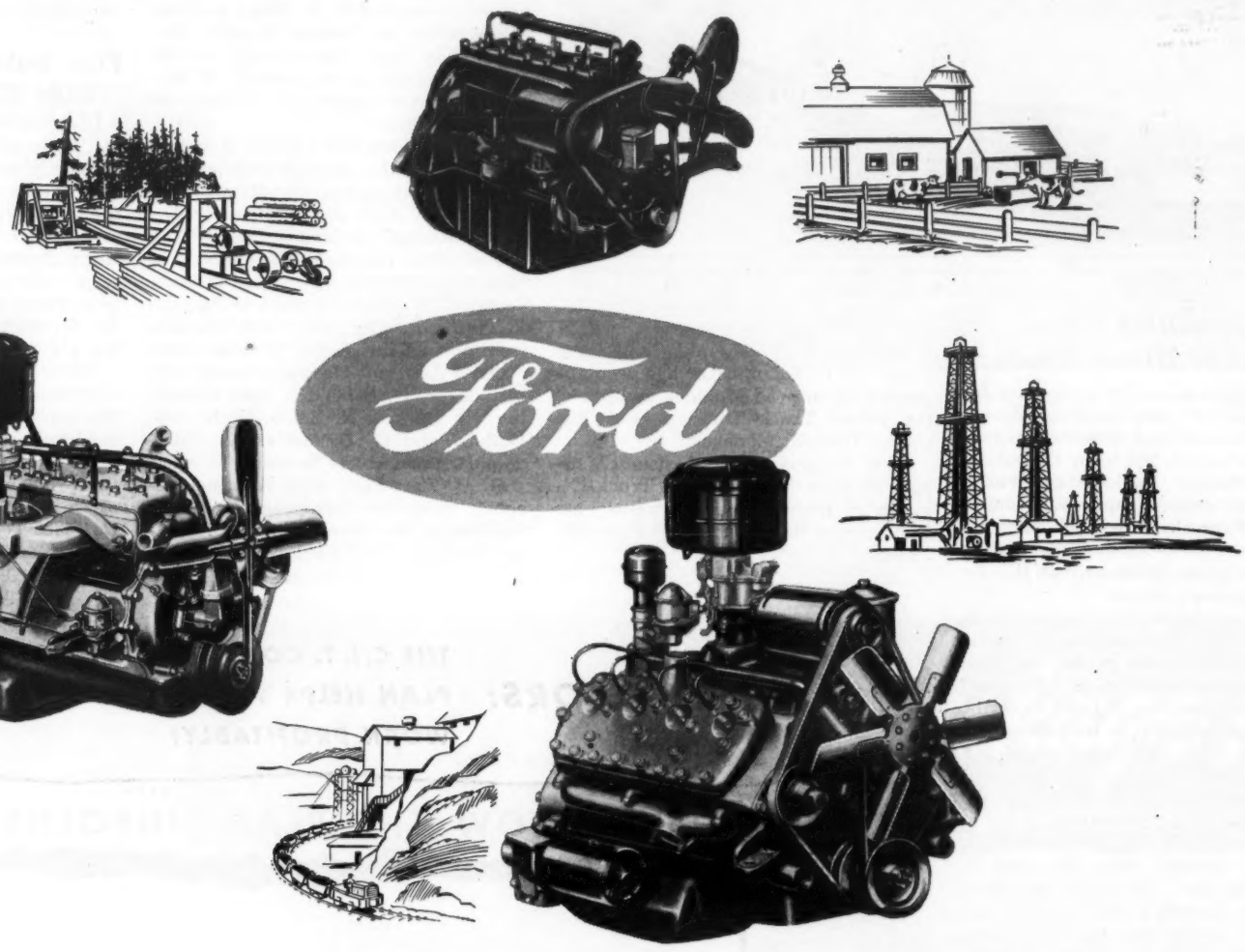
Drainage Structures

One of the major problems involved in the foundation work was making sanitary and storm-water sewer connections from the new building to the 7-foot city interceptor sewer. This lay at a depth of 55 feet below the surface of Jefferson Street at the intersection of Hudson Street. To meet this situation, a shaft 13 feet square and 52 feet deep was dug at the northeast corner of the site near Jefferson Street, and only 40 feet from the big city sewer. The top 20 feet was fairly easy digging, and the clay soil was removed by a Marion 331 crane equipped with a 45-foot boom and a Haiss ¾-yard clamshell bucket. But below this point, rock was encountered and the rest of the shaft had to be blasted out. Holes were drilled on about 2½-foot centers to depths of 4 or 5 feet and charged with ¾ stick of 40 per cent dynamite to the foot. As many as six holes were shot at a time.

The 45-foot crane boom was getting into trouble with some overhead wires in the street, so a 10-foot section of it was removed and a Stuebner 1-yard concrete bucket was then substituted for the clamshell. This bucket was lowered into the hole, filled by hand with rock, and then pulled to the surface. During a blast, or when no work was in progress in the shaft, the hole was covered with an 18 x 15-foot wooden cover with a trap door in it for the convenience of the workers. Made of 2 x 8 boards backed with 4 x 6's on 30-inch centers, the cover had four cables fastened to it so that it could be easily removed by the crane. Around the outside of the top of the shaft was a tier of sandbags to prevent surface water from running down inside.

The upper section of the shaft going through soft material had to be sheeted. After the initial 10 feet were dug, 2 x 6's or 2 x 8's, 18 feet long, were driven around the edges by an Ingersoll-Rand 63 air hammer powered by an I-R 315-cfm compressor, and braced with 8 x 8-inch rangers set on 3-foot centers. Inside this bracing another ring of sheeting was driven. It lapped the upper set by 5 feet and extended down until the rock section of the shaft was reached. This inner layer was also braced by

(Continued on page 86)



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Specifications and designs subject to change without notice.

The feature of the new Pioneer 46-VE portable crushing and screening plant is its diesel-electric power plant.

New Crushing Plant Is Diesel-Electric

Streamlined powering is provided for a new line of portable semi-electric duplex crushing and screening plants, the first of which has been announced by the Pioneer Engineering Works. Snake-belt drives, numerous shafts, chains and sprockets, beveled gears and pinions, and swivel drives have been eliminated in the plant through the use of electric-motor drives.

Known as the 46-VE, this new plant has its screen and conveyors driven by electric motors from power supplied by a diesel-electric plant. The roll crusher is driven by V-belts from the jaw crusher, which is in turn driven by a flat belt from the diesel engine. A clutch permits starting and stopping the crusher without interrupting the diesel drive to the generator.

The operating height of the new plant has been lowered from 19½ feet to about 14½ feet. Provision has been made for lowering the screen hydraulically, so that the plant has a 12½-foot overall height in transit. It is not necessary to remove the hopper when lowering the screen. The plant's moving weight is 64,000 pounds.

The plant is mounted on a main truck, supported on three axles with an equalizer between the two rear axles. Pneumatic tires are standard equipment. The 4 x 12-foot screen is of the low-angle 3½-deck type, and is used with a 10 x 36 jaw crusher and a 40 x 22-inch roll crusher. All main bearings are of the anti-friction type.

The electric motors used in this Pioneer plant are fully enclosed, fan-cooled, 220-volt. High-torque, gear-head types power the feeder and delivery conveyors. The conveyers are mounted on the new Pioneer hydraulic cradle-type trucks; they are portable and are raised and lowered by a simple lever pump.

Full details and specifications for this new Pioneer crushing and screening plant can be secured by writing the Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn. Mention this CONTRACTORS AND ENGINEERS MONTHLY news report.

International Harvester Makes Executive Changes

Continuing the general administrative reorganization which began two years ago, the International Harvester Co. has made major changes in its top management. Fowler McCormick, formerly President, has become Chairman of the Board, succeeding Judson F. Stone. John L. McCaffrey, First Vice President, has been elected to succeed Mr. McCormick.

Under the new set-up, the Chairman becomes the chief executive officer of the firm, in active charge of the business as well as chief policy-maker. The President serves as chief operating officer and has general charge of operations, the direction of other officers, and personnel.

Mr. Stone remains as a director, as does Sydney G. McAllister, whose post as Chairman of the Board's executive committee has been eliminated. The First and Second Vice Presidencies have been eliminated, and two Executive Vice Presidents substituted. W. E. Worth and P. V. Moulder hold these posts. W. C. Schumacher has been appointed to succeed Moulder as head of the Motor Truck Division, with the title of General Manager.

W. K. Perkins, former Assistant Manager of Sales for the Motor Truck Division of International Harvester, has been named Sales Manager of the Division.

The former Branch Manager at Portland, Oreg., J. T. Sullivan, has been named to succeed W. A. Riggs as Sales Manager for the Central District. Mr. Riggs has been transferred to the Northwest District, replacing R. R. McDonald, newly appointed Manager at Salt Lake City.

E. H. Watkins has become Assistant Manager for the Eastern District, and has been succeeded as Manager at Syracuse by R. R. Slater, formerly Assistant Manager at Boston.

Two other Assistant Managers have been transferred and promoted to Managers: J. H. Shafer from Los Angeles to Portland, Oreg., and L. A. Hanson, from Springfield, Mo., to Wichita, Kans.

Other Assistant Managers transferred include W. G. Schendel, from Harrisburg to Buffalo, N. Y.; D. G. Barrett, Buffalo, and G. D. McCarthy, Philadelphia, both sent to Boston.

G. D. Partridge, who returned recently from the European theater of operations, has been appointed Assistant Manager at Cleveland. He spent 3½ years as commanding officer of the 609th Ordnance Battalion, a unit made up largely of I-H men.

Film Substitute for Oil Aids Concrete-Form Work

Plywood forms used in concrete work can be handled more readily and economically with its new product Formfilm, the A. C. Horn Co. says. Coating the forms with this liquid permits their re-use several times before recoating, Horn claims. Use of the film is said to provide a smooth concrete surface, to prevent concrete from adhering to the forms, and to increase the life of the plywood.

These and other features of Formfilm are discussed in a folder available from the firm. Photographs show the process used to Formfilm plywood panels. Copies of Bulletin 4630185, which describes this product, can be secured on mention of this notice. Write the A. C. Horn Co., 4336 Tenth St., Long Island City 1, N. Y.

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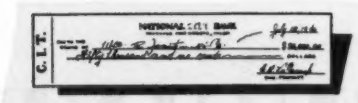

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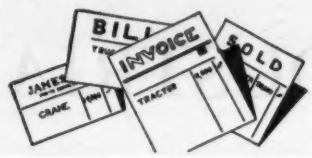

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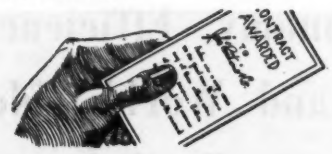
Equipment helps pay for itself out of earnings. Spread the cost over many months.



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Grading and Base For New Runways

Temporary Service Provided By Recent Contract Until The Permanent Runways Are Completed; Radio for Safety

✦ BITUMINOUS pavement on the three permanent 7,000-foot runways at the East Boston, Mass., Airport will not be completed until the end of 1946. However, air traffic at this busy international-airways terminal is being adequately taken care of on a system of three temporary runways, which were completed in April. In addition to the temporary runways, the contract awarded to B. Perini & Sons, Inc., of Framingham, Mass., by the Massachusetts Department of Public Works included grading two permanent runways which were built from blue-clay hydraulic fill pumped from Boston harbor in previous contracts. (See C. & E. M. Dec., 1944, pg. 2.)

The three temporary runways are 5,900, 4,000, and 3,900 feet long. They provide ample room for landings and take-offs of the giant C-54 passenger planes which American Airlines operates from Boston to London every Tuesday. The longest of the three temporary runways lies in a northwest-southeast direction, and a 3,500-foot portion of it on the present field has been in use by the regularly scheduled commercial passenger air-line flights out of Boston. In the Perini contract, this runway was extended 2,400 feet. In addition, another runway, D, which intersects it at an angle slightly greater than 90 degrees, was extended 1,500 feet from its initial 2,400-foot length to its present 3,900-foot dimension. Both of these runways are 200 feet wide. The third temporary runway, C, is 4,000 feet long and 300 feet wide. Its extra width is explained by the fact that it is also the southerly part of one of the field's projected 7,000-foot runways; eventually it will be included in the permanent runway system of the airport. All the work on these temporary runways goes beyond the original cinder-fill limits of the field out over the new hydraulic fill.

In building these runways, the great expanse of clay fill first had to be brought to grade and shaped. Following this, 3 feet of granular material was spread and compacted over the runway area, and then this spring the runways were given a bituminous surface treatment. The final 1,000 feet at each end of the runways was given additional strength and bearing power by a 2-inch course of bituminous-concrete paving which was laid on top of the surface-treated gravel.

Runway Grading

The permanent-runway grading, which is included in this contract, covers the 7,000-foot runway A. It also covers on runway B the 5,500 feet to Apple Island, which lies far out in Boston harbor at the southeast corner of the airport. Eventually this runway will be extended beyond the island until its final length of 7,000 feet is attained. On all the runways the longitudinal grade is dead level, with a 1½ per cent crown from the center line. This results in a drop of 2 feet 3 inches from the center to the edge, inasmuch as the width of these permanent runways is 300 feet.

When the hydraulic clay fill was being placed, controls naturally were exerted to keep the material as close to grade as possible. But the very nature of hydraulic deposition, together with changeable settlement induced by the variations in strata of clay, sand, silt, etc., in the pumped material, resulted in high and low areas on the runway grade which required leveling. Four

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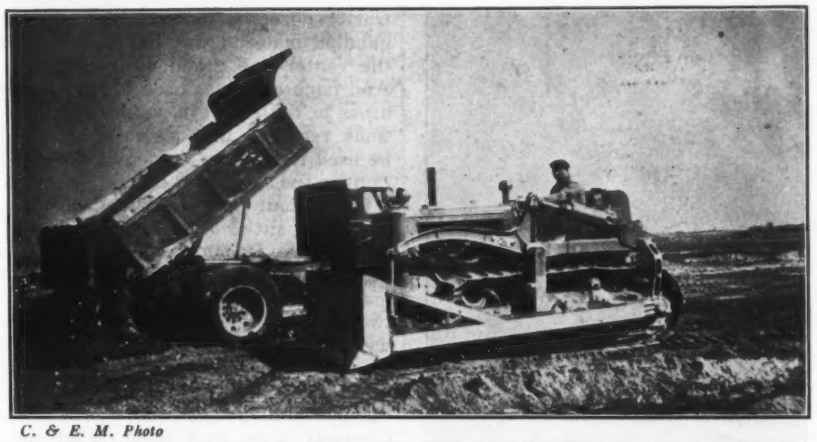
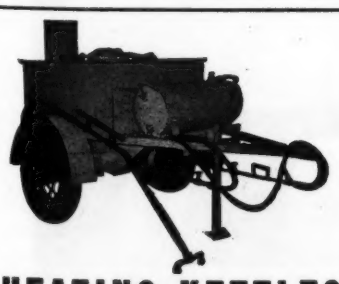


C. & E. M. Photo

Gravel for the base course for temporary runways at the East Boston Airport was brought to the grade by truck and spread by tractor-dozers. Here a Sterling truck dumps an 8-ton load, to be leveled by an International TD-14 with a Bucyrus-Erie blade.



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The NEW Lorain TL-20

C. & E. M. Photo
Draglines working on timber platforms on the clay fill handled the runway grading on the B. Perini & Sons contract at the East Boston Airport. Note the flag as a warning to aircraft on the boom of this Lorain.

New Runways

(Continued from preceding page)

draglines were used in grading the clay runways: a Northwest with a 70-foot boom and 2½-yard Page bucket; a Speedcrane with a 60-foot boom and a 1½-yard Williams bucket; a Koehring with a 60-foot boom, and 1½-yard Owen bucket; and a Lorain with a 60-foot boom and 1½-yard Page bucket.

These draglines began operations by stringing out on timber platforms along the center lines of the runways, both permanent and temporary. There they excavated and cast material to each side of the center line to the full limits of their booms. Then they moved about 80 feet farther out to each side and picked up this pile of material, along with any other to be excavated from that area, and cast it still farther towards the edge of the runway. This operation was repeated again on each half of the runway until the excavated material was moved well beyond the shoulders and side slopes of the runways and deposited beyond the drainage areas. The greatest depth of excavation was approximately 4 feet.

When this point had been reached, the piles of material thrown up by the draglines were knocked down, graded, and leveled by three Caterpillar D8 tractor-dozers. None of this thrice-handled material was left higher than the center-line grade of the runway. And none of it was used to fill up low areas in the runways, as the specifications required that granular material be used to bring to grade any low sections in the clay hydraulic fill.

Occasionally during the excavating, pockets of silt or other undesirable material were encountered. These were dug out to depths as great as 8 to 10 feet by the draglines and loaded into two 10-yard Athey wagons. The wagons were then pulled by Caterpillar D8 tractors a few hundred feet beyond the limits of the runways, where they were dumped and the material was leveled. Constant tests with penetration rods were made in the clay subgrade, and any material that was judged too soft to take the required loading was removed in a similar manner to the depths required.

Field Drainage

The center crown of the runways insures good surface runoff to both sides. The 200-foot temporary runways have 50-foot shoulders, while the 300-foot permanent runways have 20-foot shoulders; both have 10 to 1 slopes from the shoulder edge to a 4-foot drainage ditch. From the ditch the backslopes are on a 4 to 1 grade.

Side drains were installed on both sides of all the temporary runways, using 6-inch perforated coated corrugated-metal pipe with gravel backfill. Outlets of 6-inch coated corrugated-metal pipe extend through the shoulders to the drainage areas previously mentioned. The side drains are 3 feet in from the runway edges, with chimneys every 400 feet coming up through the gravel to the surface; these will be used for cleaning purposes and to check the profile of the side drains from time to time.

From the ditches the drainage water is carried in 24 to 36-inch bituminous-coated corrugated-metal pipe. The pipe is laid in trenches dug in the hydraulic clay fill to outlets in the bulkhead at the perimeter of the field, and thence to an outfall in Boston harbor. To make certain that the pipe was kept to true grade, lumber platforms were built at the bottom of the trenches as a support. These platforms consist of two 4 x 4's running longitudinally along each side of the trench, with 2 x 6-inch boards nailed across them on which the pipe rests.

Granular Base Course

The major item in this contract was the placing of a 3-foot layer of granular material on top of the clay in the three temporary runways. Over 250,000 cubic yards of gravel was required for this base course. The material was obtained from several borrow pits within a 17-mile radius of the airport, and hauled in by truck an average distance of 12 miles. The contractor made all negotiations to secure suitable pits in the metropolitan area of Boston at Watertown, Winchester, and Saugus, and used two shovels for pit excavation, a North-

(Continued on next page)

Chicago's New — Filtration Plant
79th Street and the Lake Front
Supplying PURE WATER to the South Side
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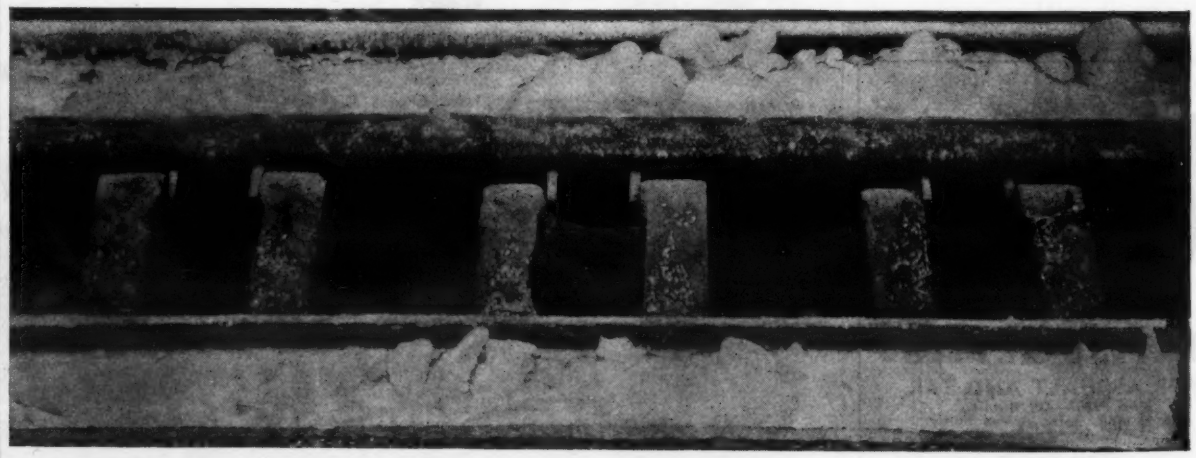
The massive concrete chambers of the South Side Filtration Plant in Chicago pictured above are free to move (as all concrete structures must with temperature change and settling) without danger of leakage or foreign matter getting into the purified water. To a large extent this is made possible by the use of Servicised Para-Plastic compound to seal the joints in the structure, so that regardless of movement they stay sealed. In addition, Servicised furnished the premolded, resilient, non-extruding joint filler which was made to meet Federal Specifications HH-F-341. In general, we recommend for use on all concrete construction required in connection with either water works or sewage treatment, Servicised Cork or Self-Expanding Cork Joint Filler combined with Servicised Para-Plastic Joint Sealing Compound for a perfect job.

Para-Plastic is scientifically made to meet all needs for waterproofing concrete joints and is given numerous tests in our laboratory prior to shipment. One of these tests is pictured below.



The above view showing the "Bond Test" gives only a small interior section of a large specially constructed Freezing Unit with powered "separators" where hundreds of small samples of Para-Plastic are tested for Bonding Power and Extendability at O'F.

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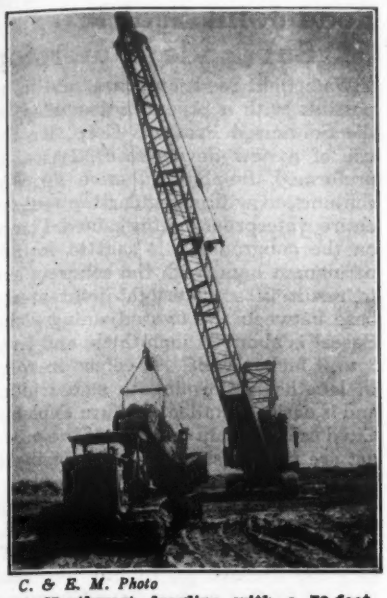

C. & E. M. Photo
A Northwest dragline with a 70-foot boom and a Page 2½-yard bucket loads an Athey 10-yard wagon pulled by a Caterpillar D8 during grading operations at the East Boston Airport.

New Runways

(*Continued from preceding page*)

west 2½-yard and a Lorain 2-yard.

To transport the gravel to the airport a great fleet of trucks was used by the contractor on the ton-haul basis, the weighing being done on a beam scale as the trucks entered the airport. Of these, the contractor owned four 13-yard bottom-dump Euclids, which carried about 15 tons of gravel. But for the most part, the material was hauled in privately owned trucks, usually of 5-ton capacity, which came from points sometimes as far away as 100 miles.

At first 60 trucks were used, but later this number was increased to 100, with a subsequent rise in the amount of gravel placed from 3,000 to 6,000 cubic yards in a 16-hour day. Two shifts of men and equipment were employed: the first from 7 a. m. to 3:30 p. m. with a half hour for lunch; the second from 4 p. m. to 12:30 a. m. the next morning, also with a half-hour break for a meal period. During the time out for meals, the trucks were gassed and oiled. An Onan light plant, with four floodlights on top of a 25-foot pipe boom mounted on a skid rig, was used where the gravel was being dumped so that operations could be carried on at night.

Compacting the Gravel

In building up the 3-foot course of gravel, a bottom layer of 2½-foot loose depth was laid first, with the trucks fanning out over the runways as they dumped their loads so as not to form ruts or develop uneven compaction. As fast as the trucks could unload, the material was spread by three International tractors, a TD-14, a TD-9, and a TD-6, all equipped with Bucyrus-Erie dozer blades. The gravel was compacted in 500-foot sections at a time, and each section was completed before the next one was begun.

The gravel was compacted by six passes of a 10-ton tractor, which was kept without a dozer blade so that it would not be taken away for other work at the expense of slighting the compaction process. An International TD-14 tractor was generally used for this purpose, but if no weaving of the subgrade was observed a heavier Caterpillar D8 tractor was sometimes used. The initial layer was comparatively thick in order to sustain the weight of the construction equipment and heavy trucks, and to prevent the clay beneath from weaving or pumping. This 2½-foot loosely laid course compacted to 2 feet, and was followed by two additional courses 6 inches thick to get the required depth of 3 feet. The final shaping of the top course was done by two Austin-Western 99-M power graders.

A slightly different gradation was required for the gravel used on the bottom 2-foot course from that used for the two upper 6-inch layers. Their gradations are as follows:

Sieve Size	Per Cent Passing	
	Lower Course	Upper Course
½-inch	100	70
No. 4	80	50
No. 200	5	5

The Massachusetts Department of Public Works maintained a field testing laboratory at the airport where sieve analyses of the gravel borrow were constantly made, and where results of the tests could be available for comparison within an hour. In this way, if the product of a section of the borrow pit was too coarse or too fine, material with opposite characteristics was hauled in and blended with the other by the tractor-dozers. Or if the gravel failed to meet the grading requirements, the location of the pit was changed at once.

Plane-Safety Precautions

It was necessary for the gravel trucks to reach the scene of construction activity at the airport as speedily as possible and without interfering with the 102 regularly scheduled daily commercial flights at the East Boston field. So the contractor built a construction road of bituminous macadam, ½ mile long, from Porter Street at the western end of the airport to the north bulkhead road. This 27-foot road has a 1-foot gravel base topped by 4½ inches of asphalt-macadam surface laid in two courses. Extending from the end of this road a gravel road was laid, parallel to the north bulkhead, to the temporary runways. The power graders kept this haul road in good shape so that the trucks could operate at top speed with their loads of gravel. Without such a path, progress over the clay fill would have been well nigh impossible.

While this access road skirted the administration area, it was still within range of one of the runways being used by planes. So the contractor had to provide both a mobile and a stationary radio receiving unit in order that contact with the control tower at the airport could be maintained at all times. In this way the movement of trucks and other equipment was under constant control in all parts of the field, and a potential hazard to planes landing and taking off at the field was eliminated.

The stationary receiving unit was set up in a 4 x 4-foot hut mounted on skids.

(*Concluded on next page*)

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New Runways

(*Continued from preceding page*)

It was hauled by a tractor to whatever portion of the field was being worked on at the time, so that orders of the control tower could be put into effect immediately with respect to the movement of equipment in that area. The mobile unit was installed in a passenger car which usually patrolled the haul road to stop any truck if the control tower so directed. Since the communication was only a one-way system, the operator receiving the message signaled acknowledgement to the tower in the daytime by stepping from the car and waving his arms; at night he turned the front of the car to the tower and blinked the headlights.

Besides these precautions, all equipment carried a yellow flag during the day, and at night a full-view red light which was easily spotted from the air by planes. These lights were also fixed to the tops of all crane booms.

Bituminous Surface

Low areas in the runways were brought up to grade with the gravel borrow. But when the shoulders and drainage slopes were low, material was added from the huge borrow hill on Governors Island at the southwest corner of the airport. This material is a till or hardpan. It is not as desirable as the gravel used for the runway base course, but much to be preferred to the clay on the runways for fill in these low spots. Excavation of this till was done with shovels, and the material was hauled in trucks an average distance of a mile to where it was needed.

The compacted gravel on the runways was given a surface treatment consisting of a prime coat of T-3 tar or MC-1 asphalt at the rate of 0.5 gallon to the square yard. After a 48-hour interval another treatment of either T-6 tar or RC-2 asphalt was applied at the rate of 0.3 gallon to the square yard. The surface was sealed with 15 pounds of sand to the square yard, and was later swept clean. The sand was not thrown on until 48 hours after the bituminous application of the seal so that a thorough penetration was achieved and not just a blotting process. The bituminous-concrete landing strip was then laid at each end of the temporary runways.

Items and Personnel

The major items in this $769,891 contract included:

Clay grading and excavation	300,000 cu. yds.
Trench excavation	5,000 cu. yds.
Gravel borrow	276,000 cu. yds.
Borrow for slopes and shoulders	40,000 cu. yds.
Bituminous material	250,000 gals.
Corrugated-metal pipe, 24 to 36-inch	2,000 lin. ft.
Perforated-metal pipe, 6-inch	16,300 lin. ft.

A force of 60 men, working two shifts part of the time, was employed by the contractor on this work which started on September 7. These men were assigned in the following capacities:

Superintendents	2
Timekeepers	2
Checkers	4
Mechanics	3
Oilers	12
Foremen	8
Laborers	8
Radio operators	2
Tractor operators	5
Shovel operators	4
Dragline operators	8
Grader operators	2
Total	60

In addition, about 130 truck drivers were employed on the project.

With the completion of this 7,900-linear-foot extension of surface-treated gravel runways as a temporary measure, normal air traffic can be carried on at the East Boston Airport. It can continue while the permanent runways, for which 12,500 linear feet of grading was included in this contract, are being completed. The total service length of the three temporary runways is 13,800 feet.

The construction of the General Edward Lawrence Logan Airport at East Boston is directed by the Massachusetts Department of Public Works, with R. W. Coburn, Chief Engineer, and Francis T. McAvoy, Construction Engineer. General Richard K. Hale is Director of Waterways, a division which includes airports in its jurisdiction, and Everett N. Hutchins is District Waterways Engineer. Julius J. Waldman was Resident Engineer on this construction, while Louis Capone was Superintendent for B. Perini & Sons, Inc.

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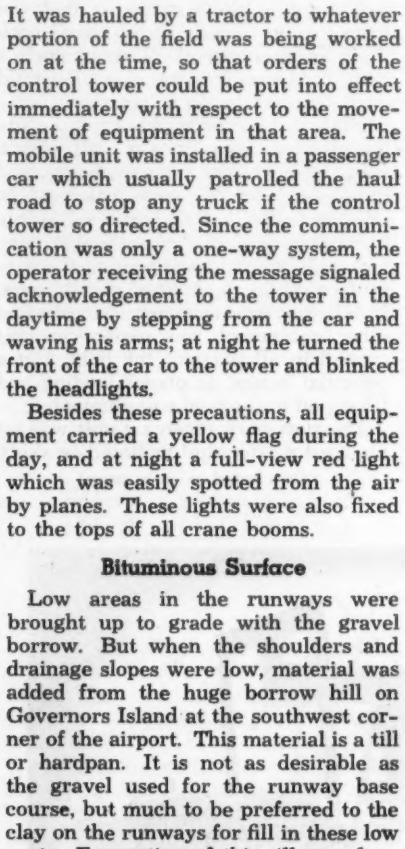
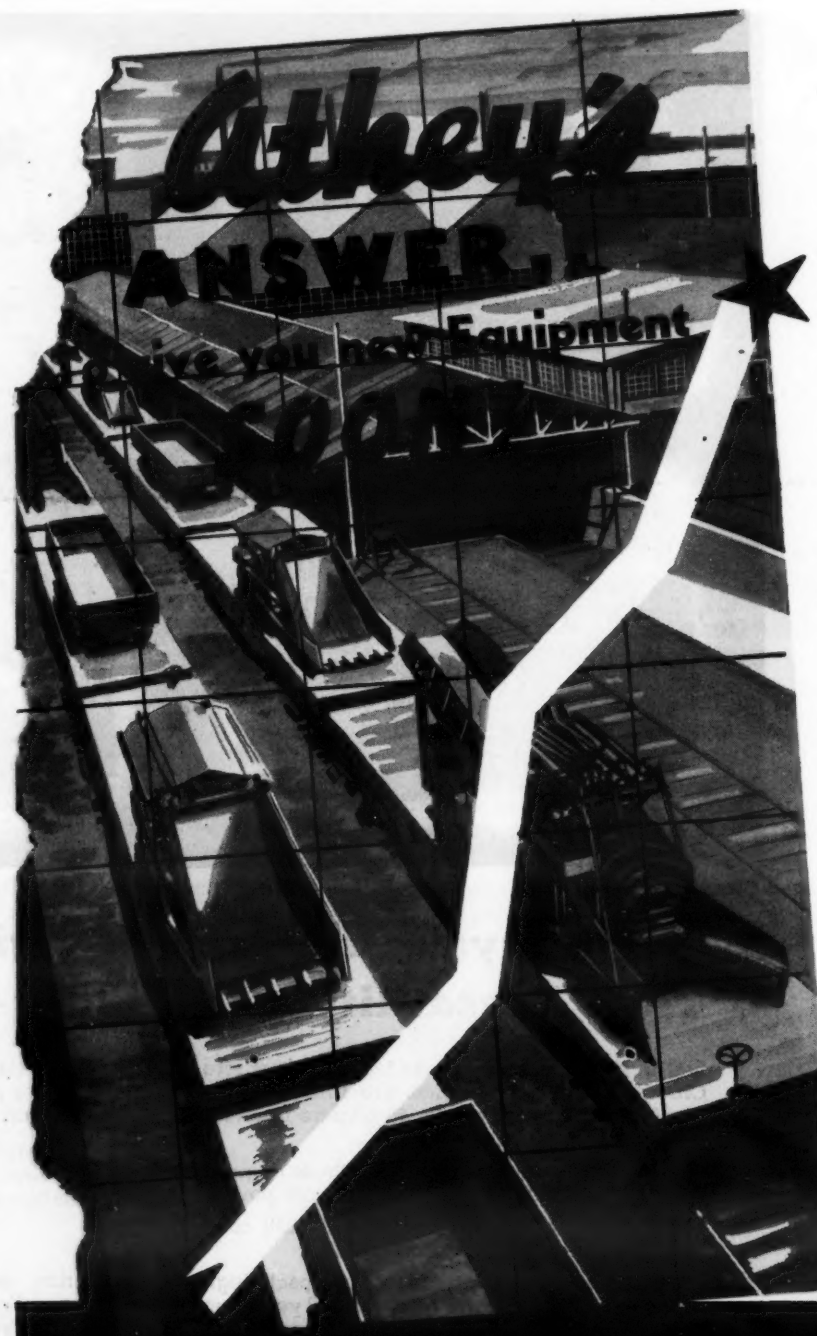
Road-Joint Seal Is Subgrade Waterstop

Watertight road joints are said to be possible with a product introduced by the Servicised Products Corp. By the use of a new development, Baseal, a preformed, flexible, adhesive strip in conjunction with a regular top seal, an entire waterproof joint is gained. Placed on the subgrade, it is said to form a permanent bond with the concrete and to result in a watertight joint at the base between the two adjoining slabs. Baseal is about ¼ inch thick, and from 3 to 8 inches wide. It comes in rolls, in lengths conforming to slab widths, and is easily installed, the firm explains. Cited as important features of the product are its cohesive, adhesive, resilient, and permanent plastic properties.

Full details and specifications of this new product can be obtained by writing the Servicised Products Corp., 6051 W. 65th St., Chicago 38, Ill. Say you read about it in CONTRACTORS AND ENGINEERS MONTHLY.





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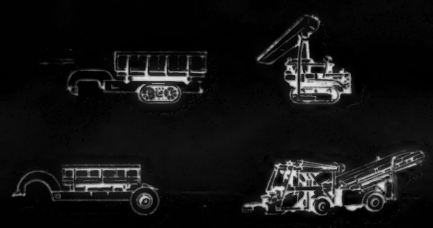

DEPENDABLE HAULING AND LOADING EQUIPMENT

Le Roi Adds Rock Drills, Other Equipment to Line

The formation of a new manufacturing unit, to be known as the Cleveland Division, has been announced by Le Roi Co., Milwaukee. The Division will produce a complete line of rock drills and related pneumatic equipment to complement the Le Roi line of portable compressors.

A modern factory equipped with the latest types of machine tools, as well as with modern metallurgical, heat-treating, and testing facilities, is to be located in Cleveland. Final design and testing have been completed on several series of tools, and production is scheduled to get under way immediately.

Cleveland Division products will be distributed on a world-wide basis, through integration with the firm's sales program. Domestic distribution will be controlled through six district offices, while the foreign sales department and distributors in the principal countries will handle the overseas market.

Russell R. Morgan, a former officer of the Cleveland Rock Drill Co., is head of the Division. Its creation marks the second expansion carried out by Le Roi in Ohio. The firm recently enlarged its Centaur Division plant at Greenwich.

Trencher Described

A unique telescoping arrangement is said to feature the boom of the Model 120 Trencher, concerning which the Buckeye Traction Ditcher Co. has just issued a new bulletin. The boom is reported to be adjustable for cutting 7, 9, or 11½-foot depths with no sacrifice of strength or rigidity.

Model 120 digs a trench from 18 to 48 inches wide, the new catalog points out. Complete specifications for the 120 are given, construction details are shown, and numerous jobs are illustrated in the 8-page brochure. Copies will be sent on request. Write the Buckeye Traction Ditcher Co., Findlay, Ohio, and mention this notice.

Mayer, Piling Man, Dies

Alexander Mayer, head of the Piling Department of the Caine Steel Co., Chicago, died May 8 after a long illness. He was well known for his development and promotion of Corr-Plate steel piling. Mr. Mayer's son, Arthur B., carries on his father's duties for Caine.

"CATERPILLAR" ACROSS THE BOARD

One of 5 "Caterpillar" Diesel DW10 Tractors with W10 Wagons, working night and day on the levee near Joiner, Ark. Each delivers about 90 yds. of earth per hour on a 3000-ft. round trip. The Lorain dragline is "Caterpillar" Diesel powered.

A "Caterpillar" Diesel No. 12 Motor Grader maintains haul roads for the fast-moving DW10s that carry earth to the levee.

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Clyde O. LaPlant, of Sikeston, Missouri, tells why he used 100% "Caterpillar" Diesels on a recent levee contract in Arkansas, and puts it in few words: "For economy, parts, service and performance they are best."

Working on this job were two track-type "Caterpillar" Diesel Tractors—a D8 and a D7—for bulldozing and disking; five "Caterpillar" Diesel DW10 Tractors, pulling "Caterpillar" W10 Wagons; a "Caterpillar" Diesel No. 12 Motor Grader, and two Lorain draglines, both powered by "Caterpillar" Diesel Engines.

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Crossing Is Eliminated By New Dual Highway

Heavy Grading Required For Relocated Road Plus Three Large Structures On Main U. S. Route

✦ A NEW 1½-mile section of dual highway on U. S. 60 has been under construction 5 miles east of Charleston, capital city of West Virginia. It will eliminate a railroad grade crossing where motorists have frequently been delayed by trains being switched in and out of the yards of the near-by du Pont plant. This new road extends the four-lane Kanawha Boulevard, scenic highway out of Charleston along the Kanawha River, from the town of Reed, where it formerly ended, to the town of Malden. Originally the heavily traveled Kanawha Boulevard narrowed down at Reed from two 22-foot concrete lanes, separated by a 4-foot median strip, to a 20-foot bituminous road; it then cut across at grade a single-track line of the New York Central Railroad paralleling the highway on up the river valley. The new road was relocated by excavating into the hillside north of the track, thus keeping clear of the railroad and furnishing a better alignment for this important east-west artery across the Mountain State.

Although only 1½ miles long, the project involved 250,000 yards of roadway excavation, and the building of three large structures: a double-barrel concrete culvert, a rigid-frame arch underpass, and a deck-girder railroad bridge. The State Road Commission of West Virginia awarded a contract to Ralph Myers Construction Co. of Salem, Ind., on its low bid of $396,562.59. This included grading and drainage of the dual road and of 0.6 mile of accessory approaches at a cloverleaf interchange with an intersecting road. Only 4,400 linear feet of concrete paving was included in this contract, as sufficient funds for paving the entire 1½ miles were not available at the time of the letting. The contract included the large culvert, but the building of the other two structures was let in a separate contract to Monty Bros. of St. Albans, W. Va., for $92,000. Both were Federal-Aid projects.

Grading started May 16, 1945, and work on the bridges got under way two weeks later. All operations except paving, which is being done this spring, were completed by the end of the year.

Roadway Grading

The new roadway section, like the existing connecting highway, has two 22-foot lanes separated by a 4-foot median strip made up of two 6-inch curbs enclosing a 3-foot grass plot. The width of the grading section was 61 feet 6 inches, as in this sidehill work the shoulders on the cut side are 6 feet wide and on the fill side, 7 feet 6 inches. A crown of ⅓ inch per foot from the center line was required in the grade.

The job was about 40 per cent rock and 60 per cent mostly clay; since the clay generally lay on top of the rock it was removed first. On this part of the work the contractor used a fleet of eight LaPlant-Choate 33-yard scrapers pulled by Caterpillar D8 tractors, with two or three other D8's acting as pushers in the loading. The average haul was slightly under 1,000 feet for the scrapers which, at a speed of 4 to 5 mph, moved about 8,000 yards in a 10-hour day. Specifications called for the dirt to be spread in 8-inch and the rock in a maximum of 36-inch layers. Compaction was achieved by two sheepsfoot rollers pulled in tandem by a D8 tractor, and with a final rolling by a Buffalo-Springfield 10-ton 3-wheel roller.

By the early part of July the softer top material was removed, exposing the rock composed of limestone, sandstone, and black slate. This had to be blasted, so holes were drilled on about 4-foot centers with a Cleveland wagon drill powered by a Schramm 105-cfm compressor. Bit sizes started at 2½ inches and decreased to 1½ inches on 1½-inch drill steel which was 6 feet long in the beginning and increased in 4-foot lifts to a maximum length of 22 feet. Bits were discarded when their cutting efficiency was reduced. In the sidehill cuts, benches were made 20 feet wide at a height of 20 feet above the grade of the finished roadway, and were shot usually about 100 feet at a time with Atlas, du Pont, Hercules, and King 40 per cent dynamite. Any large boulders that remained were given a secondary blast by drilling one or two holes half way into the large chunk of rock and inserting one stick of dynamite in each hole.

C. & E. M. Photo

Grading on the Ralph Myers 1½-mile highway contract included considerable rock work. Here a Northwest 2½-yard shovel loads one of the fleet of eight 12-yard Euclids used to haul excavated material.

Immediately following the blast, a Northwest 80-D 2½-yard shovel began

(Continued on next page)

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Crossing Is Eliminated By New Dual Highway

(*Continued from preceding page*)

excavating the rock and shale, loading it into a fleet of eight 12-yard end-dump Euclids which made an average haul of 3,000 feet at a speed of about 15 mph. In the heavy rock an average of 200 loads or 2,400 yards was moved in a 10-hour day; the quantity was increased to 300 loads or 3,600 yards when softer material was encountered. Although the full month was not worked, July saw 50,600 yards of material excavated and moved by the shovel and Euclids. The two D8 tractor-dozers assisted in these operations, one working around the shovel to clean up and push material to the bucket, the other leveling off the dump piles.

When the job was first set up, the cut and fill quantities balanced, but several slides in the sidehill excavating resulted in some excess material which was wasted by the side of the road in a vacant lot owned by the State. The highest fill was 28 feet while the deepest cut was 70 feet. In the rock cuts the side slope goes up 1 on 1 to the first 20-foot bench, and above that the slopes are ½ on 1 until the original ground is reached.

Swamp Area

Near the Malden end of the job the road was built through a swamp for 2,500 feet at the bottom of a ridge about 350 feet high. To drain this area a Lorain 40 Backdigger, working on wooden mats, cut ditches on either side of the roadway section 4 feet wide and 3 feet below swamp level, with 2 to 1 slopes. When the water had drained off and the material taken from the ditches had dried out, it was placed on the fill which in this section is 10 feet high. The material compacted solidly; yet later on in the summer, water was noticed bubbling up through the 10-foot fill in two or three places as though from a spring. The presence of several abandoned coal-mine shafts extending into the side of the hill, with accompanying seepage lines running out beneath the new fill, was the explanation for the presence of the "springs". This condition was corrected by lowering the side ditch.

The subgrade was later stabilized with a 4-inch layer of creek gravel which was obtained from Georges Creek, a shallow stream crossing the new highway about 2,000 feet from the Reed end. The gradation of this gravel was fairly small, and conformed to the specification requiring that any stone over 3 inches in size be discarded. After the gravel was dumped on the road it was spread by a Caterpillar No. 12 power grader which also had worked constantly to keep the haul roads in good shape for the earth-moving equipment. A 500-gallon-tank truck with a 6-foot spray bar mounted on a Ford truck was also available to keep the haul roads wet down and free from dust. It was equipped with a 3-inch pump for obtaining water from the creek, but so much rain fell during 1945 that only three or four tanks of water had to be used all summer to lay the dust.

Care of Equipment

About midway along the road the contractor made a clearing where equipment was brought for greasing and fueling. Two 500-gallon tanks of fuel oil were set up here and kept filled by tank trucks from Charleston. To avoid tying up equipment, the different units were pulled off the earth-moving line one at a time for greasing during the course of the day; the contractor found it impossible to get labor to do this work at night as he would have preferred.

An average of 25 employees worked on this project, including 8 operators of earth-moving equipment, 2 tractor-dozer operators, a shovel operator with an accompanying oiler, one man who did nothing but service and grease equipment, a mechanic, a power-grader operator, a roller operator, 7 laborers whose duties included the rock drilling and blasting, and 3 supervisory employees of the contractor, H. C. Walden, Engineer; H. L. Sloman, Office Manager; and W. R. Smedley, General Foreman.

C. & E. M. Photo

Pouring the 500 cubic yards of concrete in the long culvert was a continuous operation, with a Jaeger truck-mixer delivering from each side on some pours.

Long Culvert

The construction of the long culvert carrying Georges Creek under the dual highway was sublet by the Ralph Myers Construction Co. to K. M. Winslow, a contractor from Salem, Ind., who superintended the work himself. This culvert, a double-barrel affair of reinforced concrete, has two openings 7 feet high x 11 feet wide, is built on a 35-degree skew with the road to a length of 153

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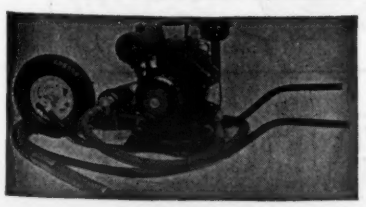

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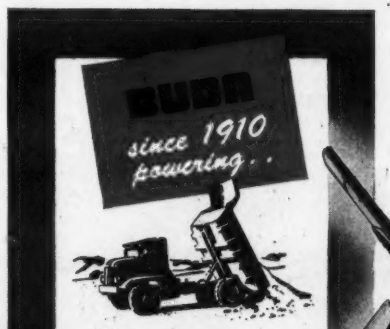

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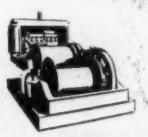

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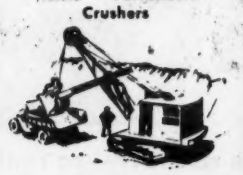

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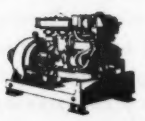

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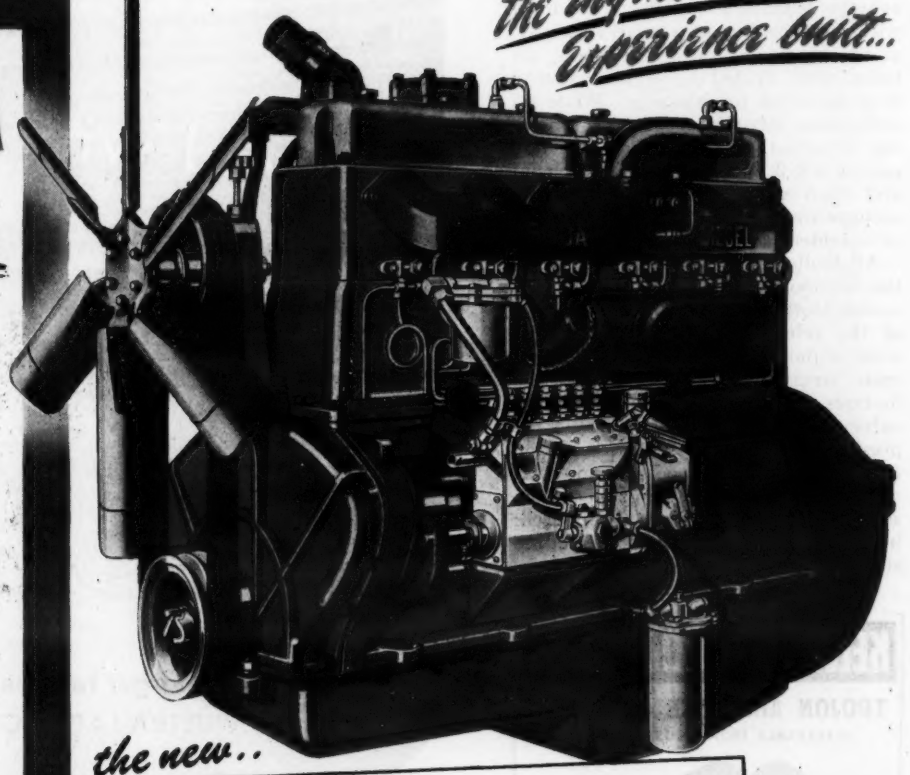

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HARVEY (*Chicago Suburb*) ILLINOIS

Crossing Is Eliminated By New Dual Highway

(*Continued from preceding page*)

feet 6 inches, and contains about 500 cubic yards of concrete. The greater part of the culvert length is covered with 10 feet of fill, but this fill slopes back to leave the last 33 feet at the outlet end uncovered. This was done, as part of a cloverleaf interchange design for a road near-by that intersects U. S. 60, so that traffic can leave the new dual highway on an accessory road having a slight downgrade, pass under the new railroad bridge, and get back on the old highway which still serves several industrial plants along the river. The uncovered 33 feet of the culvert really acts as a bridge floor for the accessory road.

In order to avoid water trouble during construction, the new culvert was built about 50 feet to one side of the creek which was later diverted to a new channel going through the structure. Excavation for channel and footings was done by an Insley K-10 crane with a 25-foot boom and a ⅜-yard Bucyrus-Erie dragline bucket which loaded the material to Ford and Chevrolet 1½-ton trucks. The material was dumped on a fill about 600 feet away and spread by a Caterpillar D8 tractor-dozer. Most of the digging, which went down to an average depth of 3 feet, was in hardpan, with the exception of a small rock area at the upstream end where about six holes were drilled by a jackhammer in preparation for blasting. While no cofferdams were required in the footing construction, three Gorman-Rupp pumps, a 2, 3, and 4-inch, were on hand and used when required to remove seepage water which appeared at times in considerable quantities.

All footings are 1½ feet deep, while the side footings are 2 feet wide and the center footing is 4 feet wide. Because of the relatively thin 10½-inch side walls of the structure, 12 x 12-inch concrete struts were built between the footings on 13-foot centers to give the culvert extra rigidity to withstand the pressure of the fill. As the foundation rests on hardpan and rock, no floor was required. After the footings were constructed, the center wall was poured; but the two side walls had to be poured simultaneously because of the long steel reinforcing rods that stretched across the top of the culvert for roof reinforcing and extended down into the walls on each side. The structure is 24 feet 7½ inches wide with a 13-inch roof under the fill, and 14½ inches at the bridge section.

Form Work

Form lumber was mostly 1 x 8-inch square-edge pine boards with the exposed surfaces faced with ¼-inch plywood. These were backed with 2 x 6-inch studs on 18-inch centers for the walls, with double 2 x 6 wales set 4 feet apart. Williams form clamps with ⅜ and ⅝-inch tie rods were placed at 3-foot centers. The forms were given a coating of pale paraffin oil. The slab was poured in six sections, five of which were 24 feet 1½ inches long, while the end or downstream section was 33 feet. In this way only one set of forms was needed for the slab, with additions, of course, having to be made for the longer section at the end.

Falsework to support the slab forms consisted of four rows, two to each side or barrel, of 8-inch posts, set on 5½-foot centers. Wedges were placed on top of the posts on which rested 8 x 8-inch caps to support 2 x 12-inch stringers placed 16 inches on centers. The bottom of the forms was 1 x 8-inch sheeting. The order of the pour was the two center sections first and second, the two adjoining sections third and fourth, the upstream end section fifth, and the

(*Continued on next page*)

C. & E. M. Photo

An Insley bucket delivers concrete to the slab on the K. M. Winslow subcontract for a 153-foot-6-inch double-barrel culvert on U. S. 60 in West Virginia.

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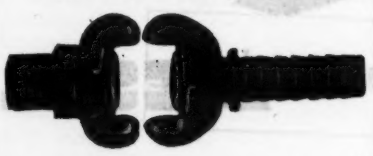

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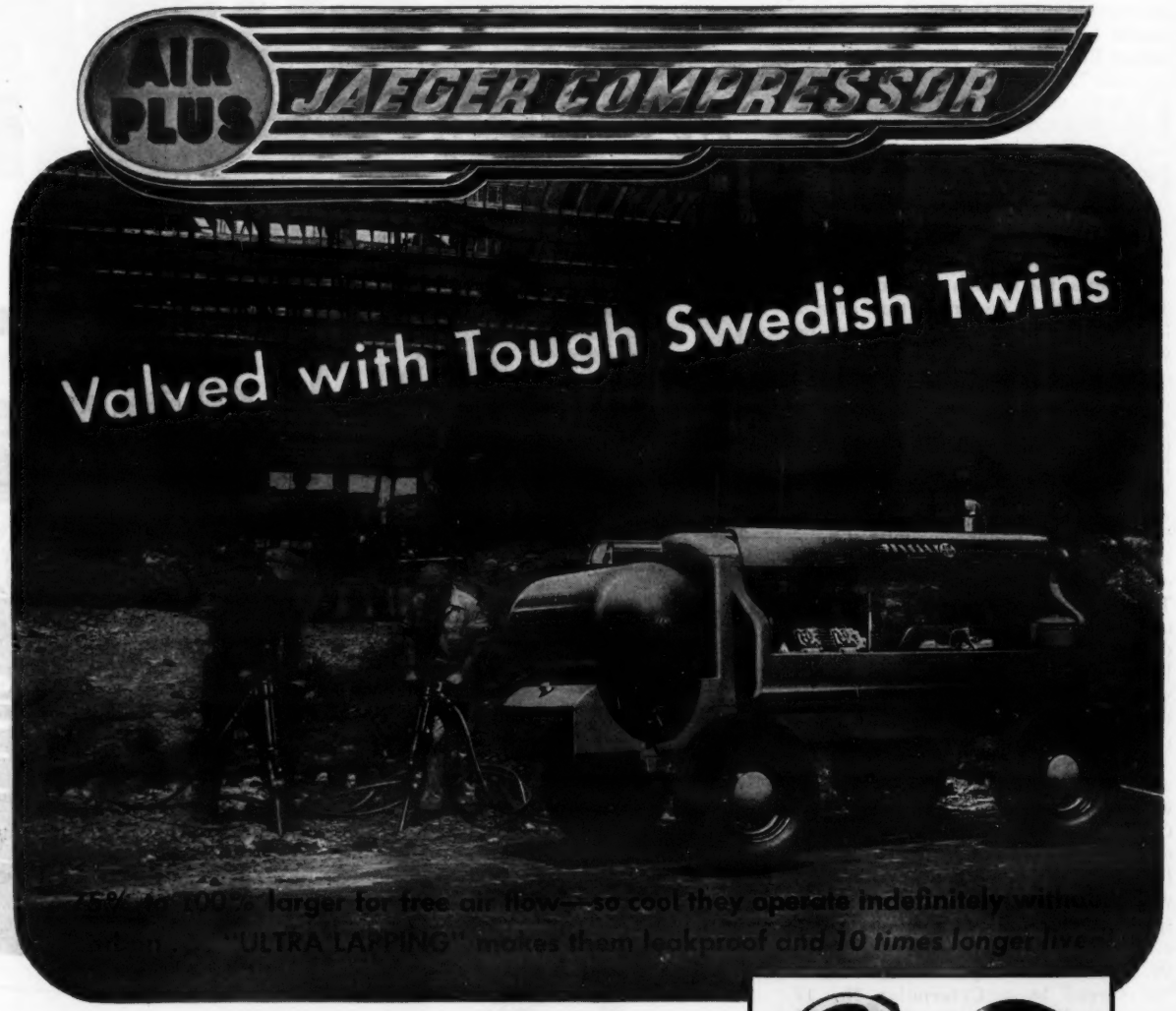

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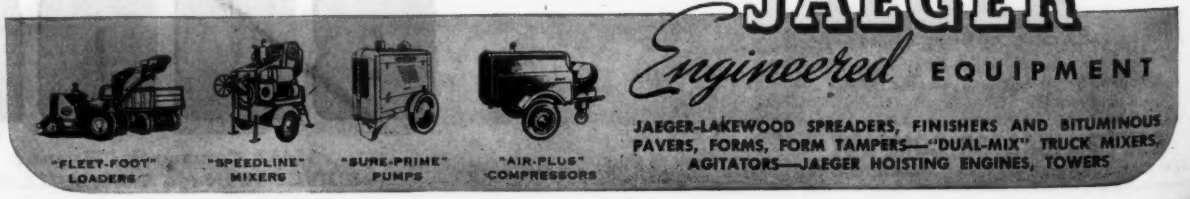

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Crossing Is Eliminated By New Dual Highway

(Continued from preceding page)

33-foot downstream end section last. Three days after a pour was completed, the slab-section form was lowered from 3 to 6 inches by removing a board at each side and loosening the wedges so that the entire section could slide freely on the caps. The crane took a position at one end of the culvert, and by means of a cable pulled the form along to where the next section was to be poured. When in the correct position the form was raised by tightening up the wedges between the pile tops and the caps.

Concreting

Concrete was furnished by Criss & Shaver, Inc., which hauled it 8 miles from its plant in South Charleston in five Jaeger 3-yard truck-mixers powered by Hercules engines and mounted on International trucks. High-early-strength cement was used. A little water was added to the ingredients at the plant to prevent gumming, but the remaining water was added at the job where the mixing took 3 minutes. Concrete pouring was a continuous operation, with trucks working from both sides of the culvert on the larger slab pours. One truck from a position up on the fill chuted its concrete directly into the forms, while on the opposite side the other truck dumped its contents into an Insley ½-yard concrete bucket, which was swung into position over the forms by the crane and emptied by the puddlers.

The concrete was vibrated by a Mall 3-hp unit and struck off with a long timber screed; then the surface was dragged with a long-handled float and checked with a straight-edge. A burlap strip was first pulled across the end section to be used as a bridge; then Sealcure was applied. The other sections were cured with wet burlap. When the structure was completed, backfilling around the walls and footings was done with gravel from the creek. Contractor Winslow employed a force of 11 men on this culvert construction, including a carpenter foreman, 6 carpenters, 2 equipment operators for the crane, tractor, and pumps, and 2 laborers. During pouring operations the entire crew handled whatever assignments were required on the concrete.

Bridge Contract

The construction of the two bridges in the separate Monty Bros. contract, with Joe Monty as Superintendent, was required first, to eliminate a grade crossing of the new dual highway with Georges Creek secondary road which intersected it at right angles; second, to replace a wooden railway trestle with a modern concrete and steel bridge, which was also part of the cloverleaf designed to speed traffic on and off the dual highway in perfect safety.

The structure to eliminate the grade crossing is a rigid-frame arch of reinforced concrete. It is 63 feet long with a 32-foot span which gives a horizontal clearance for a 26-foot roadway with a 3-foot walk on each side. It has a minimum vertical clearance of 14 feet. Traffic on Georges Creek Road thus passes under the dual highway and continues underneath the new railroad structure to the old U.S. 60. Accessory roads connecting the old and the new highways are also 26 feet wide; they are made up of two 12-foot lanes with a 4-foot widening strip on the inside lane on the curves of the cloverleaf.

Excavation for the underpass footings, 3 feet deep x 5 feet wide x 63 feet long, was handled by a Lorain 75 crane with a 65-foot boom and a 1-yard clamshell bucket. To support the footings, 10-inch 42-pound steel H-piles were driven in two rows, with a 6-foot spacing in the rows, to an average depth of 30 feet through mud and quicksand to rock. The design loading of each bearing pile was 25 tons, and each was driven to rock in about 1½ minutes by a Vulcan No. 1 steam hammer moving in the crane leads. The piles were cut off at a point so that they would project 12 inches into the footings. To the top of the piles, steel plates, 12 x 1 x 12 inches, were welded as a cap.

The abutment walls are 2 feet 2 inches thick at the halfway mark, while the slab is 1 foot thick at the center and 2 feet 2 inches thick over the walls. The bridge is designed for H15-S12 live loading. Ready-mixed concrete for the pour was purchased from Pfaff & Smith of Charleston. A 24-inch pipe line, 800 feet long, drains this underpass and also the railroad bridge, emptying into Georges Creek which flows into the Kanawha River. This highway structure cost $27,000. The major items on the construction included:

Excavation	700 cu. yds.
Steel bearing piles	2,700 lin. ft.
Class A concrete, superstructure	280 cu. yds.
Class A concrete, substructure	226 cu. yds.
Steel reinforcing bars	52,184 lbs.

Railroad Bridge

Replacing an old wooden trestle, the new railroad bridge has two gravity-type abutments and a center pier, all of concrete, supporting structural-steel deck girders which carry a single track of the New York Central line. Between the abutment and the pier on each side is a horizontal clearance of 34 feet 2 inches to accommodate a 26-foot road with a 6-foot shoulder next to the abutment, and a 2-foot 2-inch step next to the pier. The vertical clearance is 14 feet. The abutments are wide enough to carry another track should the need arise at any time.

The abutment footings are 14 feet wide through the center, 4 feet deep, and 65 feet long, while the footing for the pier is also 4 feet deep, 11 feet wide, and 45 feet long. The abutments are 8 feet 4 inches wide at the base, and 5 feet 5 inches at the top with the fill side battered 2¾ on 12. From the top of the footing to the bridge seat the abutments are 15 feet 3 inches high. The pier is

(Concluded on next page)

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High-Speed Self-Propelled **EARTHMOVERS**

Crossing Is Eliminated By New Dual Highway

(*Continued from preceding page*)

the same height, is 3 feet 8 inches thick, and is 39 feet 6 inches long.

The bridge has two spans of 37 feet 2 inches from center line of abutments to center line of pier, with a superstructure of eight 30-inch wide-flange 190-pound beams, spaced 2 feet 7¼ inches on centers, on top of which is a ¾-inch floor plate. A diaphragm consisting of a ⅜-inch web plate connects the beams at 7-foot intervals. A 4-inch layer of concrete was laid on top of the floor plate, with concrete walls placed at the sides, 20 feet apart, to contain 2 feet of ballast in which the ties are set. The bridge is designed for E-72 loading.

The wooden trestle which the new bridge replaced consisted of five bents spaced 12 feet on centers, with each bent made up of five 12-inch piles supporting caps 21 feet long. As the new structure was built on the same alignment, the center pier had to be built between two of the wooden bents, but the new abutments are located beyond the ends of the old trestle. To carry rail traffic during the construction, a temporary wooden trestle was built immediately adjacent to the new bridge; it consisted of six double bents spaced at 23, 15, 23, 15, and 23 feet in order to miss both the old bents and the new substructures. The contractor furnished the material for this temporary bridge, but it was built by the Railroad.

Of the $65,000 cost of the bridge, 15 per cent was borne by the Railroad; the remainder by the state and Federal governments. The major items were:

Excavation	2,860 cu. yds.
Concrete	1,093 cu. yds.
Reinforcing steel	33,321 lbs.
Structural steel	194,150 lbs.

Temporary Bridge

Structural steel	33,457 lbs.
Untreated lumber	31,162 MBM
Untreated timber piles	2,460 lin. ft.
Hardware	4,175 lbs.

Concrete Pavement

This spring two 22-foot lanes of concrete will be paved for a length of 4,400 feet. The slabs will have a uniform 8-inch thickness, mesh-reinforced, with an expansion joint every 93 feet and two intermediate contraction joints at 31 feet. Along the center longitudinal joint of these lanes will go ½-inch round deformed tie bars, 3 feet 6 inches long, spaced 5 feet on centers. The expansion joints will be ¾ inch thick while at both expansion and contraction joints dowel bars, ¾ inch round and 2 feet long, will be set on 1-foot centers.

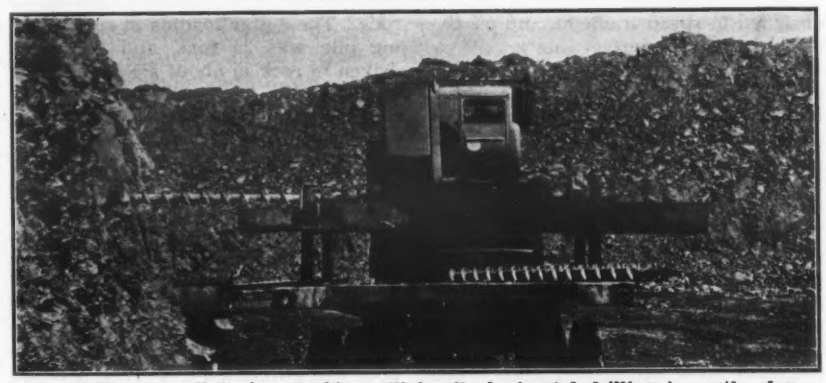
When the new pavement is completed, a temporary macadam road will be built, 600 feet long, to tie in to the present U.S. 60 on the other side of the railroad track. This will result in another grade crossing but only of a temporary nature, since future plans call for the extension of U.S. 60 farther east and the elimination of a 20-year-old structure that now separates rail and road farther up along the Kanawha.

Quantities and Personnel

The major items included in the Ralph Myers Construction Co. contract were:

Excavation, roadway	250,000 cu. yds.
Excavation, structures	8,000 cu. yds.
Concrete pavement	30,000 sq. yds.
Mesh reinforcing	128,000 lbs.
Dowels and tie bars	36,000 lbs.
Reinforced-concrete pipe, 18 to 36-inch	5,700 lin. ft.
Concrete for structures	1,000 cu. yds.
Reinforcing steel for structures	50,000 lbs.

The State Road Commission of West Virginia is headed by E. L. Worthington, Commissioner, with M. L. O'Neale as Chief Engineer, George W. McAlpin, State Construction Engineer, and B. D. Johnson, Construction Engineer. Commission Engineers on the project were Frank Kennedy, Resident Engineer, and Harry Shumate and Henry V. Sahlin, Inspectors.



The McCarthy earth-boring machine will handle horizontal drilling in earth, clay, sandrock, or limestone formations.

Finger-Tip Control On Horizontal Drill

Four "go" controls and one reverse operate from a single position by finger-tip control in the hydraulically operated McCarthy earth-boring machine for horizontal drilling. Built by the Salem Tool Co., the drill bores 9-inch-diameter holes to a horizontal depth of 150 feet in ordinary earth formation, and will operate effectively in clay, sandrock, or limestone overburdens.

"You can inch a McCarthy along at practically zero, or drill as fast as 6 feet per minute," Salem claims. The drill head rotates from a 50-rpm slow speed to a high speed of 400 rpm. The latest type of conveyor augers have hardened edges and replaceable bits to speed the work. The unit is built with either truck or trailer-type mountings.

Full details concerning the McCarthy earth borer can be obtained on mention of this notice. Write the Salem Tool Co., Salem, Ohio.

Data on Floodlight Unit

Construction engineers will be interested in a data sheet just released on the new Consolidated gasoline-driven floodlight unit. The unit provides independent on-the-spot light and auxiliary power. Current furnished to four 1,000-watt wide-diffusion lamps is 120-volt single-phase and 208-volt three-phase. The unit is built with either wheel or skid mounting.

Copies of the data sheet for this 6¼-kva gasoline-powered floodlight can be obtained by writing the Consolidated Diesel Electric Corp., 230 E. 8th St., Mount Vernon, N. Y. Mention this news item.

Take a LOAD off Your Engines

DON'T let power-stealing by-products of oxidation put an extra load on your heavy-duty gasoline and Diesel engines. Lubricate them with *Texaco Ursa Oil X***. This great oil has extremely high resistance to oxidation, and is both detergent and dispersive.

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TEXACO REG. T.M.

TEXACO

Self-Propelled Crane Is Fully Convertible

A new self-propelled mobile crane has been announced by the Unit Crane & Shovel Corp. of Milwaukee. The crane is mounted on pneumatic tires, and can be converted to a shovel, trench hoe, backfiller, clamshell, dragline, or magnet. It is known as the Unit 357 Mobile Crane.

The Unit full-vision cab features this new equipment. Its visibility around a complete circle is said to give the operator more light, safety, and weather protection. A 2-speed air-actuated transmission gives the new crane a traveling speed of 9 mph at an engine speed of 2,550 rpm.

The crane is mounted on six wheels—singles on the steering axle and duals on the rear axle. It has 4-wheel air brakes, disk clutches, and a hydraulic steering mechanism. Power is supplied by a 67-hp 8-cylinder heavy-duty gasoline engine. An electric starter, oil-wash cleaner, battery ignition, and a 40-gallon fuel tank are other features.

The new Unit 357 Mobile Crane with Trenchoe attachment is adaptable to many digging and trenching jobs.

When used as a crane, the 357 has a capacity of from 3 to 7 tons. For shovel, dragline, or clamshell duty, it has a ⅜ to ½-yard capacity. Outriggers are provided for special lifting tasks.

Full details and specifications for this new mobile unit can be secured from the manufacturer, the Unit Crane & Shovel Corp., 6309 W. Burnham, Milwaukee 14, Wis. Mention this illustrated news item.

All-Purpose Jack

The Simplex No. 310A general-purpose jack is the subject of a new bulletin issued by Templeton, Kenly & Co. The jack is designed for lifting and lowering, pushing and pulling, for rigging, bridge work, pulling casing, pushing culverts, repairing power shovels and other heavy equipment, and moving or skidding machinery. It has a 15-ton capacity.

A description of the 310A, together with illustrations of other Simplex jacks, is found in the new bulletin, No. 1245. Copies may be obtained on mention of this notice. Write Templeton, Kenly & Co., 1020 So. Central Ave., Chicago 44, Ill.

New Tennessee Dealer

The organization of the Power Equipment Co. has been announced in Knoxville, Tenn., by R. S. Tucker, its President. Located at 1358 Island Home Ave., the firm will provide sales and service facilities for construction and industrial equipment. R. O. Wright is Vice President, and Morgan B. Ayres, Secretary-Treasurer.

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GOOD APPLICATION within a wide range of amperages.
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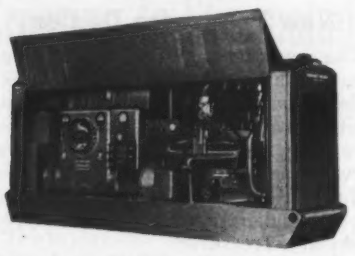


The new Hobart 300-ampere gas-engine-driven welder has an in-built ac generator which can be used for auxiliary power.

Auxiliary Generator Supplied With Welder

An auxiliary ac generator built into a 300-ampere welder is a new development in its arc welders, the Hobart Brothers Co., Hobart Square, Troy, Ohio, has announced. For many years, the firm has manufactured gasoline-driven arc welders with built-in auxiliary dc generators of 115 and 230-volt capacities.

The new development takes advantage of the oversize separate exciter, using it to supply excitation to both the welding generator and the ac generator. Through an arrangement of station and panel connections, it is possible to furnish the following power combinations simultaneously, Hobart says: 110 or 220 volts, 60 cycle, single phase; 110/220 volt, 60 cycle, single phase, 3 wire; 220 volts, 60 cycle, three phase.

The panel provides receptacles and studs for connecting, to the power required, an ac voltmeter with dual scale, a frequency meter, and a rheostat for controlling the ac voltage. This auxiliary ac generator is available in two sizes, 6 and 12-kw.

Complete details will be furnished by Hobart Brothers.

Using Ball Bearings

The vital part ball bearings play to keep America's industry humming is well known to all. The New Departure Division of General Motors has issued a 12-page booklet on their use and care. Titled "Service Procedure for Ball Bearings", the pamphlet discusses types of bearings, storage and handling, removal, cleaning, inspection, and mounting. Photographs and diagrams illustrate the wrong and the right ways of treating ball bearings.

Copies of the booklet, No. ND-A57, can be obtained from New Departure, Bristol, Conn. Say you saw this report.

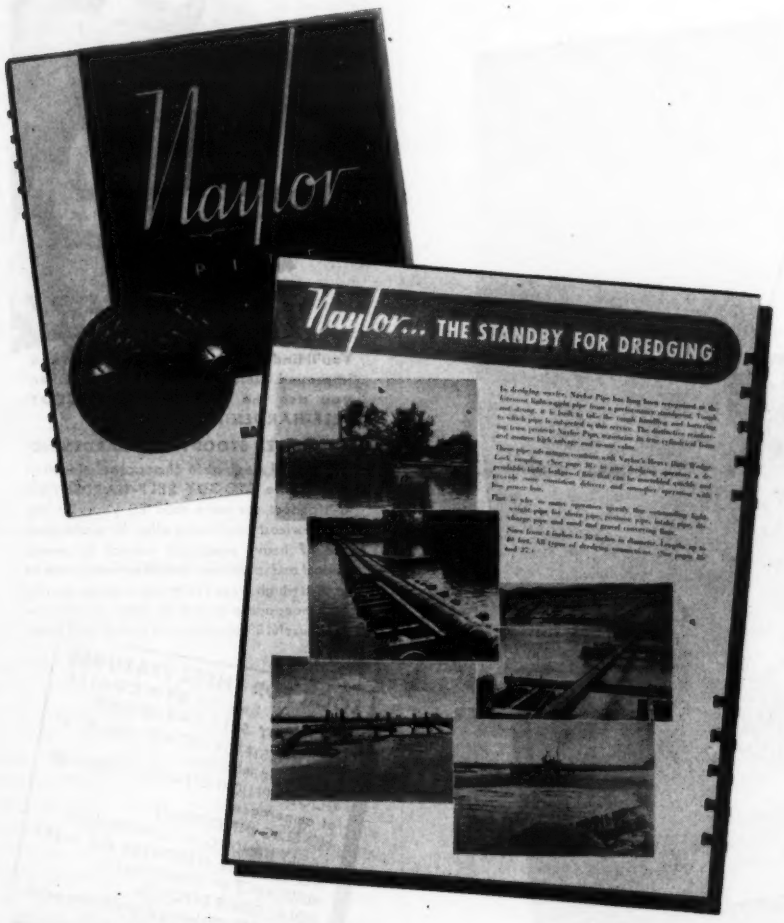
Sales Representatives For Barco Gas Hammers

The Barco Mfg. Co. of Chicago, maker of gasoline hammers, has appointed sales representatives for Arizona, Oklahoma, Louisiana, Mississippi, and the south Atlantic and northeast Atlantic states.

D. W. Jacquays, 132 W. Granada, Phoenix, will handle the Barco line in all of Arizona except Mohave and Yuma Counties. This will supplement the sales and service facilities of the Francis Wagner Co., El Paso, Texas, whose activities extend into Arizona.

The Brown Machinery Co. of Oklahoma City will serve Oklahoma. The Fletcher Equipment & Supply Co., 609 Tchoupitoulas St., New Orleans, will handle the Barco market in lower Louisiana and southern Mississippi.

A. B. Pinson will serve as Barco sales representative in the south Atlantic states, and W. S. Withers in the northeast Atlantic district.



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Tough and strong, Naylor light-weight pipe is built to take the rough handling and battering to which pipe is subjected in dredging service. The exclusive Lockseam Spiralweld provides a reinforcing truss that protects Naylor Pipe, maintains its true cylindrical form and assures high salvage and re-use value. That's why Naylor is the one light-weight pipe that can be used in service which normally requires heavier wall pipe. Combining Naylor Pipe with Naylor's Heavy-Duty Wedge-Lock Coupling gives you a dependable, tight, leakproof line that can be assembled quickly and provide more consistent delivery and smoother operation with less power loss

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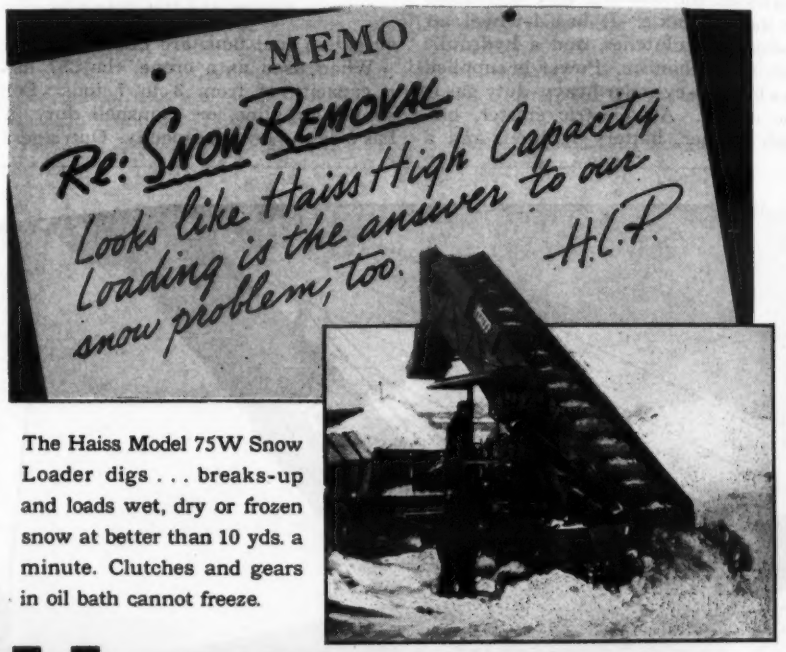

The Haiss Model 75W Snow Loader digs . . . breaks-up and loads wet, dry or frozen snow at better than 10 yds. a minute. Clutches and gears in oil bath cannot freeze.

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Scraper Industry Faces Order Backlog; Output Up

A 1½-year backlog of demand faced manufacturers of dirt-moving scrapers at the first of 1946, the Bureau of Census reports. At that time, the industry had unfilled orders for 5,493 units. This total showed an increase of 80 per cent in unfilled orders from September 30, 1945. However, this number may be somewhat over the actual figure because of duplication of orders with more than one manufacturer.

The scraper industry shipped more units during the fourth quarter of 1945 than in any previous quarterly period for which statistics are available. Last quarter shipments totaled 1,707 as compared with 1,306 made during the third quarter. The average of 1,506 for these quarters represents a 130 per cent increase over the quarterly rate for the 5-year period preceding the war.

Domestic shipments in the third quarter of 1945 numbered 1,211 for a total value of $3,881,341; and in the fourth quarter, 1,487, valued at $5,740,176. In all, 95 scrapers valued at $356,439 were exported during the third period, and 220, with a value of $901,907, during the fourth.

Heads C-P Diesel Sales

Robert A. Rankin, formerly Assistant Manager of the Diesel Engine Division of Chicago Pneumatic Tool Co., has been appointed Sales Manager for the Division. He succeeds H. W. Buker, who has retired after 20 years in the post.

Diesel Motor Grader Featured in New Booklet

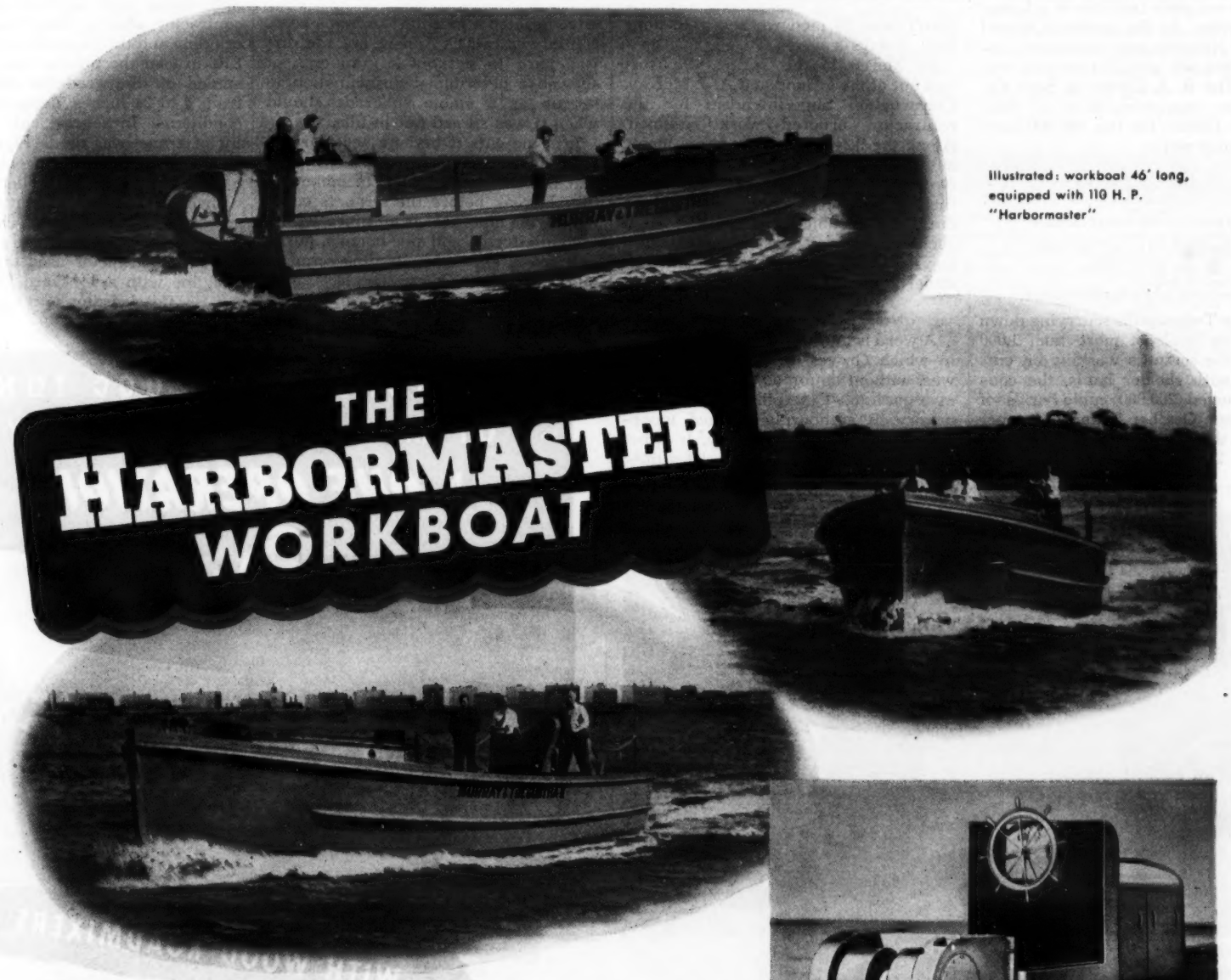
Civilian production is well under way on the Caterpillar diesel No. 12 motor grader, which is featured in a new folder published by the Caterpillar Tractor Co. The publication presents a brief description and many illustrations of the construction and production attributes of the motor grader.

The No. 12's long life and operational economy; its 75-hp diesel engine; its 6-speed transmission; and its mechanical power controls are among the features discussed. Emphasis is placed on the maneuverability and full range of positions possible with the blade centered on blade beams.

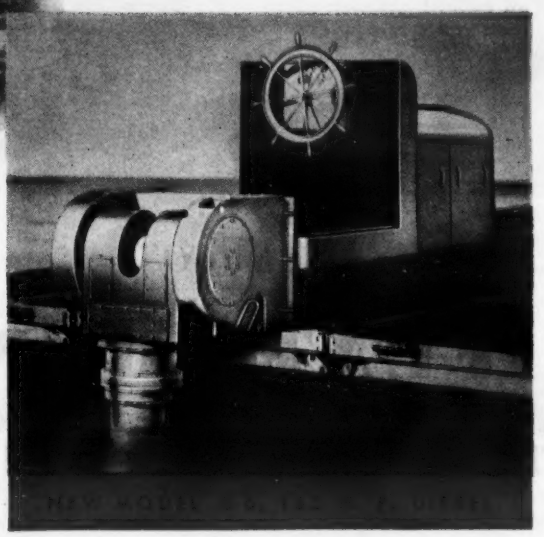
Readers of CONTRACTORS AND ENGINEERS MONTHLY can obtain copies of this folder, Form 9354, by writing to the firm at Peoria 8, Ill.

Torrence Joins Link-Belt

George P. Torrence, who resigned as President in 1936 after 25 years with the Link-Belt Co., has returned to the firm as Executive Vice President. He has been serving as Vice President and General Manager of the Rayon Machinery Corp. and as President of the Cleveland Pneumatic Tool Co. Mr. Torrence is scheduled to succeed William C. Carter as President of Link-Belt next November.



Illustrated: workboat 46' long, equipped with 110 H. P. "Harbormaster"



Designed and constructed for all types of marine operations in shallow and deep water . . . delivers 100% efficiency of the all-around features of the "Harbormaster". Here is the most maneuverable workboat in any field . . . spins on its own axis by means of the exclusive patented 360° Propeller Thrust Steering Control. Here, at last, is the acme of maintenance efficiency . . . service and repair on the spot (Exclusive 180° Elevating Mechanism elevates entire submerged assembly out of water within easy reach).

Yes, the "Harbormaster" workboat can do your marine work better. Write today for complete details of ***all*** "Harbormaster" workboats using various models ranging from 20 H. P. to 330 H. P., diesel or gasoline. Remember, the "Harbormaster" ***delivers more thrust per horsepower in continuous heavy-duty performance*** than any other conventional propelling and steering equipment!

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Scrapers Move Hard Clay on Grading Job

(*Continued from page 1*)

and walnut up to 48 inches in diameter confronted the grubbers. Three Caterpillar D8 tractors with cable-controlled LeTourneau Angledozers solved the problem of removing the heavy growth. A labor crew of 15 men and a foreman used hand tools and two Mall chain power saws, when it was necessary, to clear away the brush and light timber.

Meanwhile, the contractor was establishing his field office near the middle of the contract and setting up a repair shop with complete facilities in a leased barn near-by. As the grubbers moved down the right-of-way, equipment arrived on the job and dirt moving was started. The S. J. Groves & Sons Co. shipped an impressive force of dirt-movers to Illinois for this 680,000-yard job. Included were:

20 Caterpillar D8 tractors
3 LeTourneau 20-yard scrapers
3 LeTourneau 18-yard scrapers
3 LeTourneau 12-yard scrapers
6 Tournapull Super C's with 12-yard Carryalls
3 Caterpillar No. 12 motor patrols
1 Lima 602 dragline with 1½-yard Page bucket
20 Ford and Chevrolet 4-yard trucks
1 Caterpillar D7 with Hi-Lift loader
1 Bucyrus-Erie 20B dragline
6 LeTourneau 2 and 3-drum sheepsfoot rollers

With the Tournapulls scurrying down the cuts on hauls of more than 1,000 feet and the scrapers working on cuts and fills with shorter hauls, the contractor moved 200,000 cubic yards of dirt between October 15 and December 1, despite the fact that weather permitted only 22 working days. When it didn't rain, 55 men worked a 10-hour shift, 6 days a week.

C. & E. M. Photo

Field Superintendent Duncan McDougall gives some instructions to Ray Bex of Palestine, Ill., operator of one of the Caterpillar-Carryall outfits on the job.

By March 15 this spring, the frost was out of the ground and A. J. McKay, Construction Superintendent for the contractor, ordered work resumed. Along the 9.2-mile job are three major cuts, two of them 800 feet long and between 25 feet and 30 feet deep. Into these cuts went the scrapers to scoop out 130,000 cubic yards of dirt from each. Balance on these cuts split both ways, with fill about evenly divided in either direction from the center.

Soil Is Tough

A word is in order concerning the soil in which Groves' scrapers worked. It was, without doubt, as ornery a dirt as ever got into a Caterpillar's tracks. Wet or dry, it stubbornly resisted movement. A silty, unstable clay, it either packed into an adhesive, moist gumbo or compacted under the sun into a hard, continuous brick. And where the dirt was hard to get out of the cuts, it showed a determined disinclination to set up as a stable subgrade should when it was spread out in fills.

In some cuts it became necessary to go in first with a Caterpillar D8 tractor and LeTourneau scarifier to make the initial break before the scrapers could handle the material. At all times, working both in cuts and side borrow, pusher tractors assisted in loading scrapers and Carryalls. Caterpillar D8's with bulldozers and Caterpillar No. 12 motor graders worked in fills, not so much to assist in spreading, but to keep a haul road open for the Tournapulls and the Caterpillars.

As the subgrade was built up, all fills were compacted from the natural ground up to the finished grade in 6-inch lifts. Compaction to 90 per cent wet-weight maximum density, as determined by the Proctor curve, was obtained with two 3-drum and four 2-drum LeTourneau sheepsfoot rollers followed by Rome 20-inch tandem disks.

Gravel Base

In preparation for paving, the finished grade was topped with 70,000 cubic yards of granular borrow. This was hauled in the 20 Ford and Chevrolet 4-yard trucks from a state-owned pit a mile north from Lawrenceville. The contractor used a Bucyrus-Erie 20B dragline and the Caterpillar D7 and Hi-Lift to load the pit-run gravel. It was spread on the grade in lifts ranging from 6 to 24 inches, depending on soil conditions. In several cuts, a 24-inch lift of gravel was used. Final compaction over the gravel was obtained with a Bros pneumatic-tire roller.

Incidental to preparation of the new subgrade was a channel change in a small creek at the west end of the project. The contractor used the Lima 602 dragline with a 1½-yard Page bucket

(*Concluded on next page*)

"CEMCO"

FLAT-IRON

Airplane-Tired Road Roller That Cuts Compacting Costs

New in Principle, Construction and Operation

The FLAT-IRON pneumatic tired roller (Pat. app. for) was designed by an experienced Paving Contractor, to SMOOTH as well as COMPACT Stabilized Bases, Bituminous "cold lay" Wearing surfaces and Seal Coat aggregates.

That FLAT-IRON substantially meets the design requirements is witnessed by the fact of its increasing use on Soil-Cement Courses. It does not break the bond of cement in the process of setting, whereas, "Knead type" rollers have been specifically ruled out in many cases.

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Construction Equipment & Manufacturing Co.

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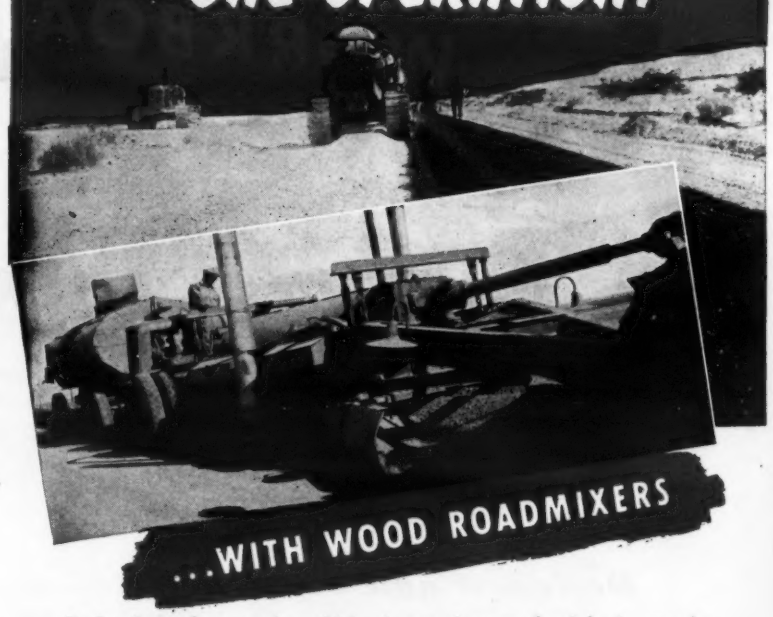
GET MORE THAN 2000 TONS OF MIX PER 8-HOUR DAY IN *ONE OPERATION!*



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The Wood Roadmixer is a complete travel mixing plant—pulled and powered by a crawler tractor. See your Wood Roadmixer dealer or write direct for literature and prices on Roadmixers, Tank Trailers, Windrowers, and V-Spreaders. 48

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Scrapers Move Hard Clay on Grading Job

(Continued from preceding page)

to excavate 30,000 cubic yards of dirt for a 4,000-foot channel. The cut for the channel is 8 feet deep with a 14-foot bottom and 2 to 1 sideslopes.

Grading done by S. J. Groves & Sons Co. provides the subgrade for a reinforced-concrete slab, 10 inches thick and 24 feet wide, flanked by 10-foot shoulders on either side. Average shoulder slopes are 4 to 1 and average backslopes are 3 to 1. The maximum haul on the grading work was 2,200 feet. Tournapulls and Carryalls, doing all hauling over 1,000 feet, were slowed down by the soil condition. They made a round trip on a heavy 1,500-foot haul in between 6 and 7 minutes.

Repairs and Maintenance

When the contractor moved in on this job, he set up facilities for handling almost all major and minor repair work in a barn near the middle of the job. At the repair shop, Master Mechanic George Larson and 5 mechanics worked 10 hours a day, 6 days a week, rain or shine, to keep all equipment in productive operation. During the winter months while grading was halted, sparks flew in the old barn as six Tournapulls, ten Caterpillar D8's, and other units were overhauled. Repair equipment at this temporary field shop included two Lincoln welders, a 30-ton drill press, a Black & Decker valve grinder, electric drills, and a battery charger.

It is not, however, the policy of S. J. Groves & Sons to wait for a piece of equipment to break down before giving it attention. The company stresses preventive maintenance to keep equipment out on the job where it belongs. And lubrication is recognized as an essential in any preventive-maintenance program. So all equipment on this project was serviced at least once every day with a Graco compressed-air greaser on a Ford flat truck with a canopy cover.

Since most of the equipment on the job was cable-controlled, preventive maintenance was carried a step further through the use of ½-inch 6 x 19 preformed-type wire rope on all scrapers. Commenting on the selection of preformed scraper rope, Duncan McDougall, Field Superintendent for the contractor, said:

"I haven't used anything but a preformed-type wire rope for a long time. I know some contractors are still using the ordinary type of cables on their scrapers, but my experience has taught me that a preformed cable will outwear and outlast ordinary rope, in addition to being easier and safer to handle. I have yet to see a preformed cable that has raveled."

Personnel

W. W. Polk is Chief Highway Engineer for the Illinois Division of Highways. R. H. Major, District Engineer, is in direct charge of this project, with I. C. Bliss as Resident Engineer. The contractor's forces included A. J. McKay, Minneapolis, Construction Superintendent; Duncan McDougall, Dane, Wis., Field Superintendent; Ralph Moss, Paris, Ill., Chief Engineer; Everett Sargent, Bedford, Ind., and Lynn Johnson, Elcho, Wis., Grade Foremen; and George Larson, Minneapolis, Master Mechanic.

Paving, totaling 130,000 square yards of concrete, was scheduled to start May 15 by the Harrison Engineering & Construction Corp., Kansas City, Mo.

C. & E. M. Photo

S. J. Groves & Sons Co. set up its field repair shop in a barn near the middle of the job, with an ample yard for equipment.

Stokstad Back on Duty As Michigan Soils Engr.

Olaf L. Stokstad has returned to his post as Soils Engineer in the Michigan State Highway Department. Mr. Stokstad served in the Detroit Engineer District during the war, holding the rank of Lieutenant Colonel. He was recently awarded the Army Commendation Ribbon for his services in the District, where he was responsible for the proper use of soil as an engineering material in the construction and maintenance of all airfields, cantonments, roads, dikes, and embankments.

Rubber-Belting Catalog

Simple non-technical terms are used by Hewitt-Robins in a new catalog designed to help maintenance men select the proper belting for the job. The 2-color loose-leaf publication gives specifications on the firm's line of conveyor, transmission, and elevator belting sold under the brand names of Monarch, Ajax, and Conservo.

Maintenance suggestions advise users how to prolong the life of belts and avoid costly production delays. Photographs show actual applications of many of the firm's products. Belt constructions are illustrated in sectional drawings.

Copies of the new catalog can be obtained from the Hewitt Rubber Division of Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

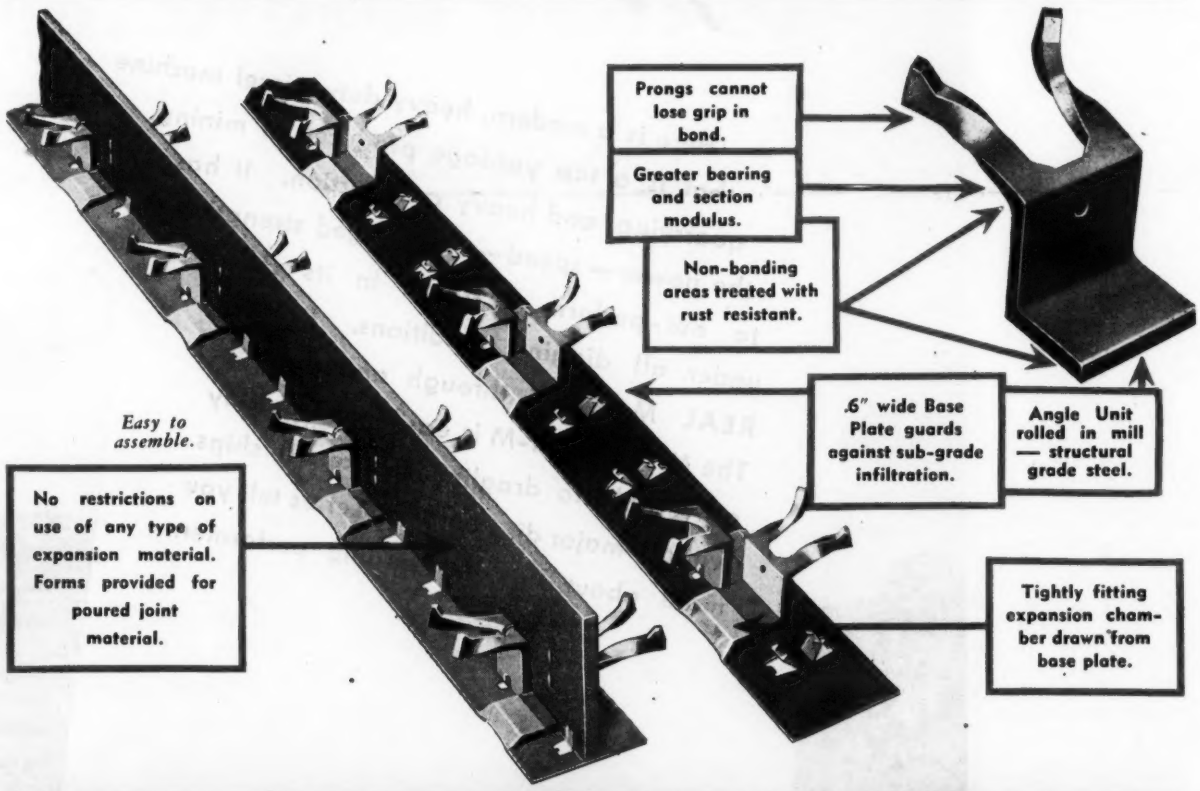
TRANSLODE EXPANSION JOINT

The continued effort on the part of Highway and Airport Engineers for smoother pavements has a. enlisted the interest and cooperative efforts of Highway Steel Products Company. The essential requirements of a load transfer device to permit unrestrained expansion and contraction and to hold the abutting edges at an even and smooth surface are achieved with Translode joints.

The functional life of the Translode Expansion joint is designed for the life of the pavement. The non-bonding area of the load transfer Zee bar units are treated with a rust resistant.

The ease of assembly and installation add to the economy of specifying Translode. The continuous base plate solves all problems of installing joints on granular and pin resisting subgrades. The rigidity of the Translode assembly insures against accidents in handling. The ease and simplicity of alignment assure better looking pavements.

The Translode joint offers no delaying factor to the employment of modern concrete spreaders and finishing machines.


Prongs cannot lose grip in bond.
Greater bearing and section modulus.
Non-bonding areas treated with rust resistant.
.6" wide Base Plate guards against sub-grade infiltration.
Angle Unit rolled in mill — structural grade steel.
Easy to assemble.
No restrictions on use of any type of expansion material. Forms provided for poured joint material.
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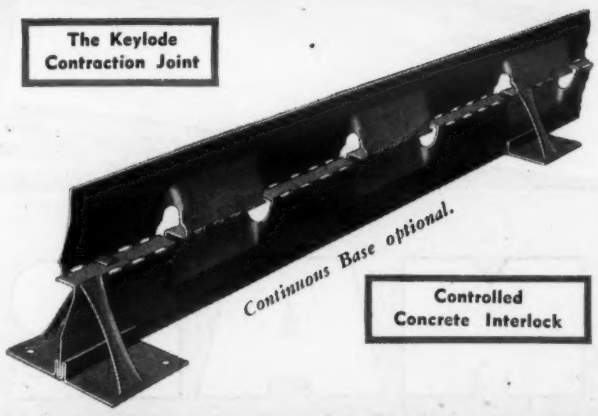
KEYLODE CONTRACTION JOINT



The Keylode Contraction Joint has these features:

(1.) Tests of opened joints in Shear prove Keylode superiority.
(2.) Greater bearing surface of alternating, interlocking six-inch pockets provide positive, continuous load transfer.
(3.) Abutting ends of slabs are molded into glass smooth surfaces that eliminate the grinding action of rough concrete faces.
(4.) Pavement surfaces cannot fault at joints. The Keylode will not allow independent deflection of slabs.
(5.) Has no resistance to warping in any direction.
(6.) Low in cost permitting spacing for positive crack control without increasing pavement cost.
(7.) Simplicity of installation reduces costs of placement to minimum.

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N. Y. State Officials and Contractors Discuss Wages

Progress towards the solution of wage and hour problems which have been retarding New York State's $840,000,000 five-year program of public works construction and reconstruction has been reported. Charles H. Sells, State Superintendent of Public Works, made this announcement at the conclusion of a recent conference of State officials, contractors, and representatives of labor.

One of the accomplishments was the appointment of a committee to meet with Federal officials to devise means of ironing out the difficulties which confront contractors in the matter of wage rates. The maximum wage scales authorized by the Federal Wage Stabilization Board are frequently lower than the minimum wage rates required by the New York State Department of Labor, thus preventing contractors from taking jobs without danger of Federal prosecution for overpayments to workers.

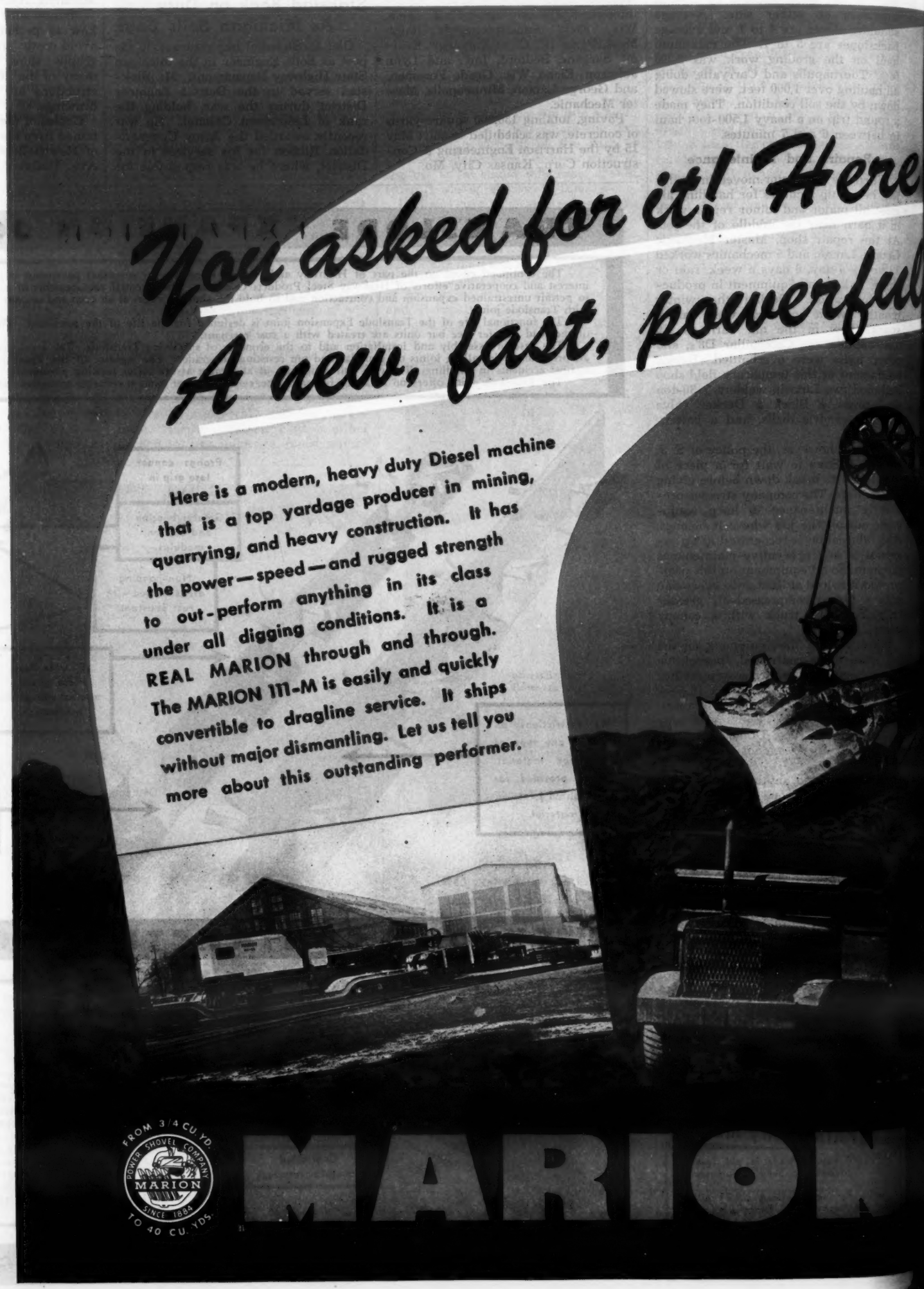
It is reported that the Federal Department of Labor and its Wage Stabilization Board have agreed to cooperate with New York State to eliminate such discrepancies in wage schedules. This is to be done by a mutual interchange of wage data and adjustment of rate variations through conference.

Smith in Hyster Post

Milton H. (Mike) Smith has been named Supervisor of fork-type lift-truck engineering for the Hyster Co., at the Portland, Oreg., home office.

Concrete-Mixer Catalog

The thorough re-mixing action of the new Kwik-Mix 11-S Dandie concrete mixer and its heavy-duty construction are emphasized by the Kwik-Mix Co., Port Washington, Wis., in new literature available to our readers. End and side-discharge models feature the 11-S Dandie type. The catalog contains 38 photographs and diagrams of the mixer. Copies can be secured by writing direct to the manufacturer. Say you saw this notice.


You asked for it! Here it
A new, fast, powerful
Here is a modern, heavy duty Diesel machine that is a top yardage producer in mining, quarrying, and heavy construction. It has the power—speed—and rugged strength to out-perform anything in its class under all digging conditions. It is a REAL MARION through and through. The MARION 111-M is easily and quickly convertible to dragline service. It ships without major dismantling. Let us tell you more about this outstanding performer.
FROM 3/4 CU. YD.
POWER SHOVEL COMPANY
MARION
SINCE 1884
TO 40 CU. YDS.
MARION

New Organization Begins Macadam-Pavement Study

Organized for research and engineering study aimed at the improvement and development of macadam pavements, Macadam Pavements, Inc., has issued its first informational bulletin. The folder contains two suggested typical sections for pavement design: one for roads having traffic volumes above 2,000 per day; the other for roads used less. A suggested typical section for widening and resurfacing is also shown.

Other information contained in the folder includes the story of John L. McAdam and the macadam pavements. A short review tells the history of the organization, which was formed last June. Murray D. Shaffer is Engineer-Director; offices are in the Huntington Bank Bldg., Columbus 15, Ohio. The group has two technical committees now at work. One seeks ways and means of improving specifications and methods of construction. The other seeks to develop improved equipment for producing materials and incorporating them into the pavement.

Persons interested in receiving copies of Bulletin No. 1 may write the Director at the above address.

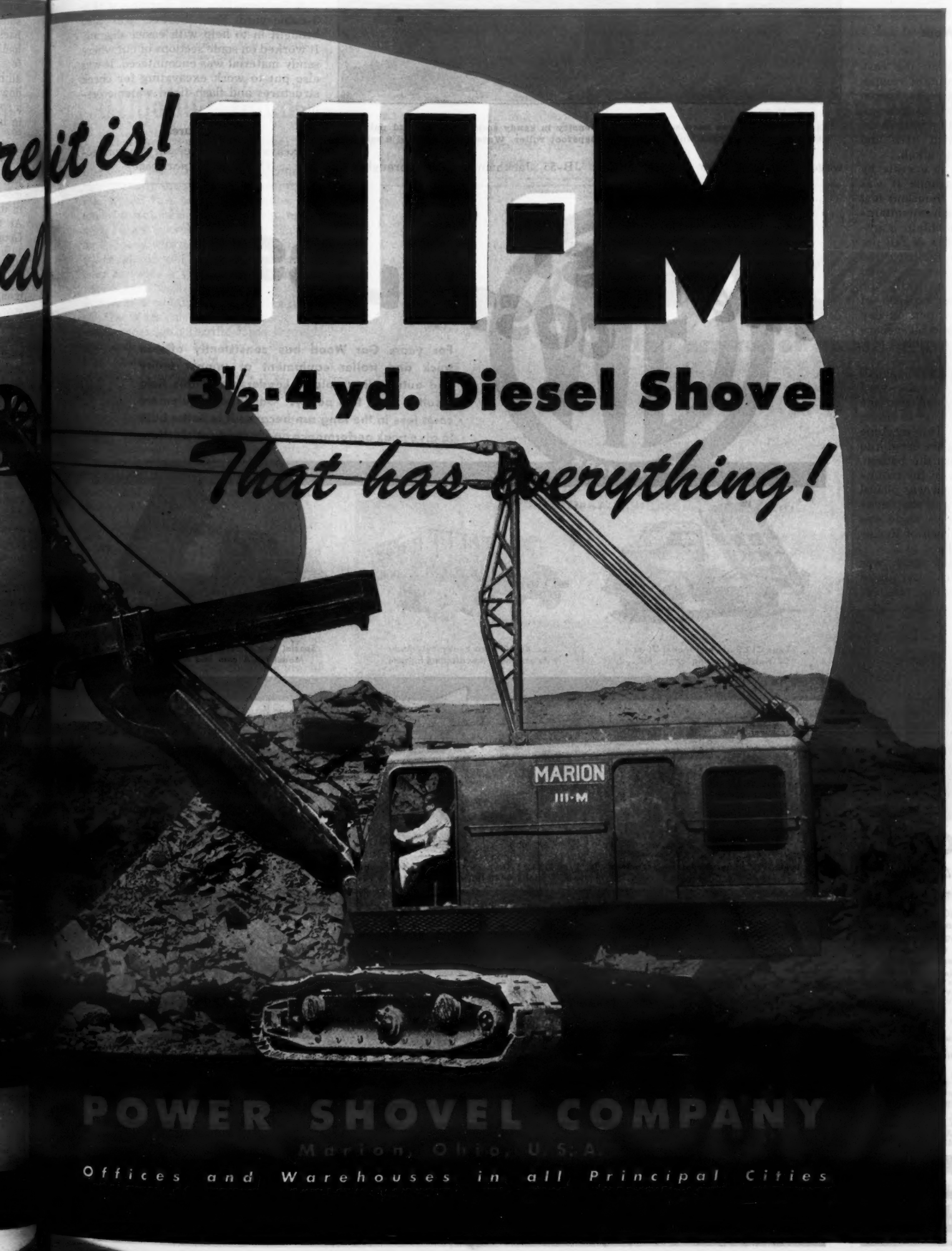
Given Goodrich Post

The appointment of W. F. Billingsley as Manager of Tire Construction has been announced by the B. F. Goodrich Co., Akron, Ohio. He has been with the firm since 1929, and was assigned to special tire-development problems during the war.

Asphalt-Melting Kettles

An internal-tube heating system, said to be instantly removable, is described in a new catalog on the Speed-Master melting kettle for tar, asphalt, and pitch, just issued by the Hauck Mfg. Co. Trailer and skid kettles of the new Speed-Master type are shown, together with accessories, in the booklet.

Copies of the catalog, No. 661, are available to readers on mention of this notice. Write Hauck at 124-136 Tenth St., Brooklyn 15, N. Y.



Irrigation Canal

(*Continued from page 2*)

decreases to 1,300 second-feet at mile 86, the point of entrance into the Coachella Valley. Today, the Shea Co. has finished cutting 11 more miles on a project which seemed impossible to the Army in 1876 and absurd to everyone in 1849—at least to everyone but obscure Ebenezer Hadley and a common medical practitioner named Dr. Wozencraft.

Canal Earth Work

The irrigable land of the rich Coachella Valley is flanked on the east, north, and west by mountain ranges. Chocolate brown and red rocks, barren except for scattered tufts of sagebrush or greasewood, merge with a blue shale. Sand is everywhere, with here and there a few spots of white alkali.

Irrigation canals have to operate by gravity. So here at Coachella it was necessary to cut several thousand feet of the new canal through mountain-range toe in order to maintain a hydraulic gradient of 8 inches of fall per mile. Dr. Wozencraft, visualizing the ways and means of his dream, would probably have planned to skirt the mountain range, at the expense of fewer irrigable acres. But present-day methods of construction and big-capacity machines made possible cuts straight through the range.

Shea purchased a Bucyrus-Monighan 5W machine with a 6-cubic-yard bucket and a 130-foot boom from the Columbia Construction Co. at Long Beach, a Kaiser affiliate. This machine was put to work roughing the canal into shape, 12 feet wide across the bottom, with 1½ to 1 side slopes. In the mountain sections, a 4-foot berm was placed at the top of the canal, and the backslopes were cut to whatever slope was directed by the U. S. Bureau of Reclamation. This was generally 1 to 1.

Since the mountainous part was rocky, it was necessary to blast ahead of the Monighan. Two Gardner-Denver wagon drills with four Ingersoll-Rand JB-55 Jackhamers were brought in with a 365-cfm and a 210-cfm Gardner-Denver air compressor. These machines drove 20-foot straight holes on approximate 10-foot centers down the axis of the canal, using detachable bits on Timken steel. The holes were carried only to within a foot of grade, to keep away from overbreak. They were loaded to within 4 feet of the ground surface with 20 per cent Hercules black powder. This powerful, slow-acting explosive shook the soft sand-rock formation enough to increase the Monighan's digging efficiency and lower the wear sustained in digging hard material.

C. & E. M. Photo

Heavy watering was necessary to obtain density in sandy soil. Here a Euclid pulls a 4,600-gallon water tank, followed by a sheepsfoot roller. Water was pumped 8 miles.

A Bucyrus-Erie 52B machine, with a 3-cubic-yard Esco bucket, was also brought in to help with easier digging. It worked on some sections of cut where sandy material was encountered. It was also put to work excavating for check structures and flash-flood water crossings.

Structures

Excavation was necessary in connec-

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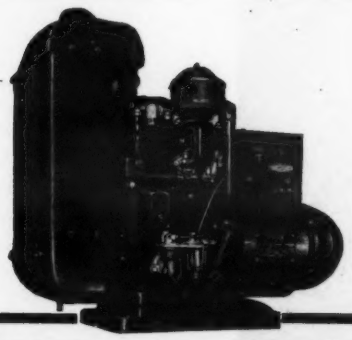

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CAPACITY RANGE: 350 to 35,000 watts. ALTERNATING CURRENT: 115 and 230 volts, 50 and 60-cycle, single phase for all capacities. Three-phase for models 3 KW or larger. Other voltages and frequencies available.

DIRECT CURRENT: 115 and 230 volts, 600 to 10,000 watts. 6, 12 and 32-volt battery charging types to 3500 watts.

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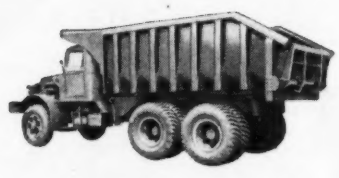
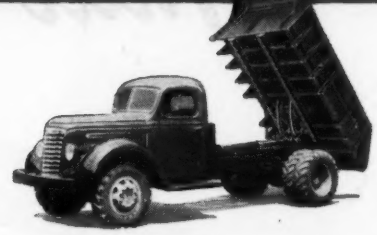
For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.

Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.



Type X-112 Extra heavy duty Body with automatic downfolding tailgate.

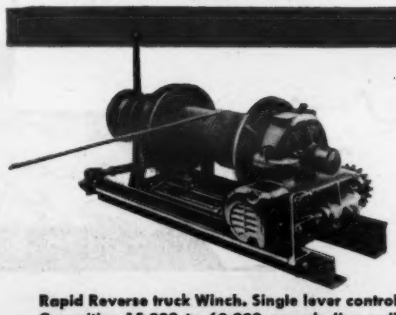


Special rock Body, scoop type rear end. Model F4CA cam and roller Hoist.

Type W12 Body. Model F4C cam and roller Hoist. Capacity 6 cu. yds.

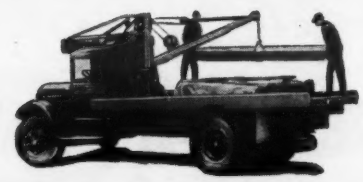
Type X-112 Extra heavy duty Body, scoop end, with Model T-4440 Hoist. Capacity 19 cu. yds.

Type W12 Body, front recessed for Model TV83 Hoist. Capacity 15 cu. yds.



Rapid Reverse truck Winch. Single lever control. Capacities 15,000 to 60,000 pounds line pull.

West Coast Special W-12 Body, Model F8C cam and roller Hoist. Capacity 10 cu. yds.



Telescopic boom Crane. Radius 8 to 20 feet.

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WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

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C. & E. M. Photo
In some places, as shown here, the new canal was built on top of existing ground. The sloping sides are being formed on a dense section, compacted by a sheepsfoot roller.

Irrigation Canal

(Continued from preceding page)

tion with these structures to accommodate not only the water in the canal, but rain water. It is an ironic paradox that one of the chief design problems in this arid desert was how to take care of flash floods. Normally, not enough rain water falls to wet the land, but perhaps once or twice a year all the water the region gets from precipitation will fall at once in a cloudburst. Whipping down off the sides of the mountains, this water races with terrific force through the land towards the Salton Sea, 250 feet below sea level. It rolls huge boulders, erodes the desert, and tears at the foundation of highway bridges in its path.

In order to catch this water six "overshoots" were designed by the USBR for the Coachella job. These are simply concrete bridges, with a channel top; they carry floodwater over the irrigation canal and so prevent its running down into the canal.

Dike Added

When 3,000 feet of the new canal had been excavated, one of the rare cloudbursts occurred. As a result, sections of the canal were filled with debris and eroded material. And after the storm subsided, it became apparent that extra protection would have to be provided on the upstream side. At that time the contract called for the construction of 22 miles of canal, with no protective dike. The contract was changed by reducing canal mileage to 11, and providing for the construction of an uncompacted earth barrier on the upstream side of the canal towards the mountains. This dike, 25 feet high and constructed continuously for 17 miles, will impound 21,000 acre-feet of storm runoff water. The impounded water will be released through two evacuation channels of 3,000-second-feet capacity each.

Dr. Wozencraft's original idea had been to dig the canal by mule team. But the USBR improved his scheme somewhat, and added irrigable acres, by carrying the new canal as high as practicable through the territory. Thus not only did the design call for heavy cuts, but in the case of many thousands of feet the new canal was actually built *above* existing ground level.

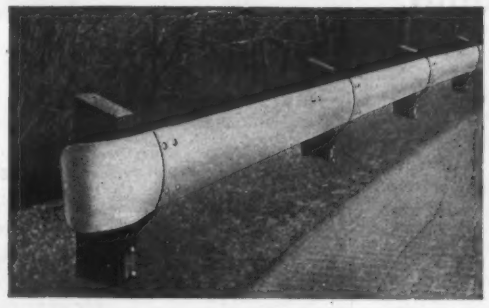
Equipment Used

Wherever this type of construction was done, both canal sides and bottom were heavily compacted and built by tractor equipment. A fleet was brought in of 13 Caterpillar D8 and 2 Caterpillar D7 tractors, 3 LeTourneau Model F and 5 LeTourneau Model W Carryalls, 3 tamping rollers, and a 4,600-gallon water tank mounted on a Euclid wagon chassis and pulled by a Euclid. One-way hauls from the borrow pit averaged 450 feet. Two pusher tractors were used in the borrow pit to assist in loading the Carryalls. Earth was dumped in 10-inch layers, watered by repeated trips with the tank truck, and rolled nine times with a twin sheepsfoot roller towed by a D7 tractor.

Water was brought to the job by pumping from the Salton Sea through 48,000 feet of 6 and 8-inch OD plain-end pipe. Several sections were welded together in the yard, and the lengthened sections were joined by Dresser couplings in the field. Where Dr. Wozencraft once carried his own meager supply of life-giving water across the desert, powerful pumps now forced it for miles ahead of the existing canal. A 4-inch Gorman-Rupp jetting pump, powered by a Chrysler industrial gasoline engine, was used at the canal with a 6-inch Gorman-Rupp Model 16A, powered by a Le Roi engine. Two 4-inch booster pumps, one Jaeger and one Pacific, were used in the line to keep the water moving. Both were powered by Ford V-8 engines.

Water was carried ahead and distributed through the borrow pit by 3,500 feet of Calco pipe and couplings, rang-

(Concluded on next page)



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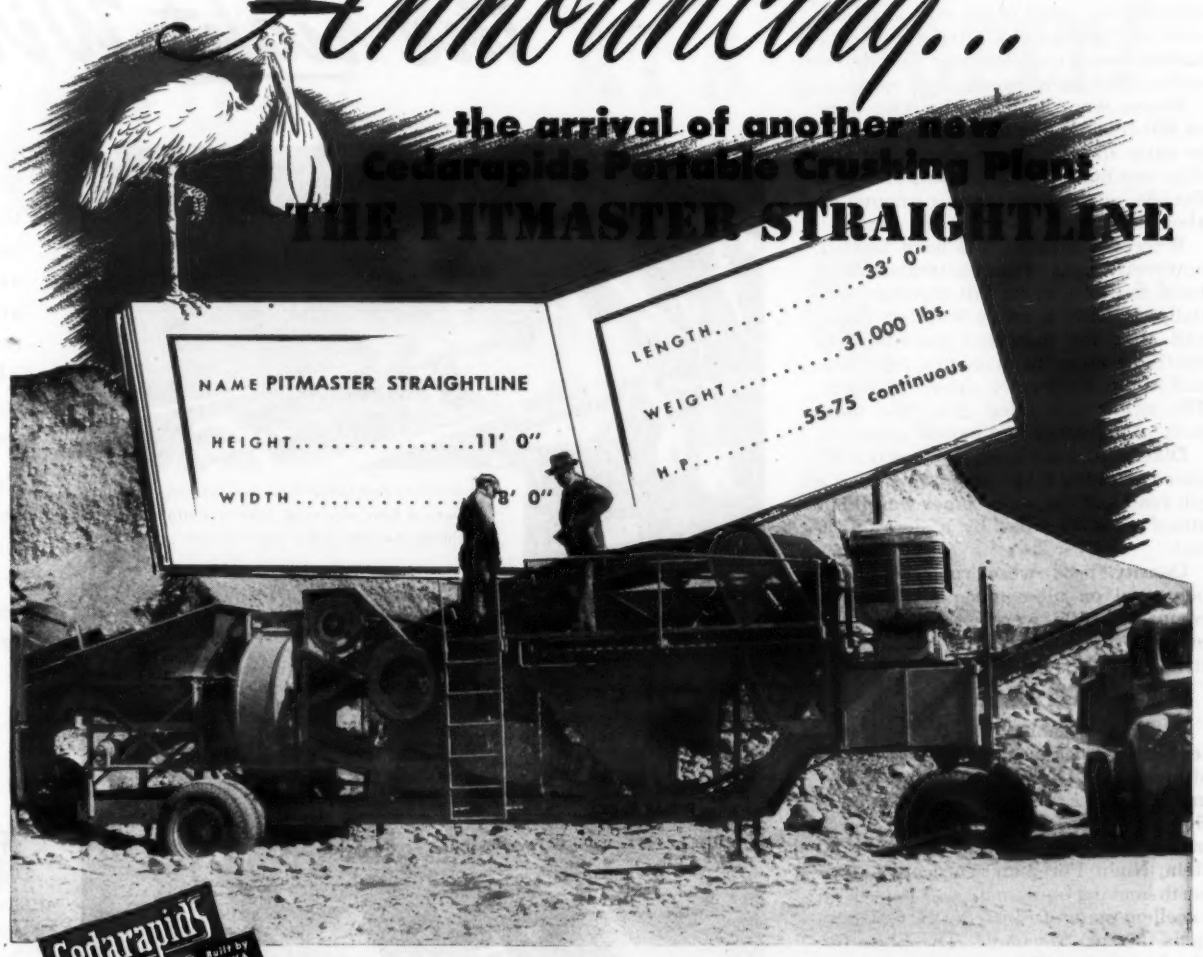
THE PITMASTER STRAIGHTLINE



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10" x 16" roller bearing jaw crusher and 16" x 16" roller bearing roll crusher give you plenty of crushing output. Horizontal vibrating screen assures greater capacity, closer grading, higher efficiency and requires less head room. Available with chip screen, hopper and feeder or swivel feed conveyor. Fast, easy set-up and take-down minimize lost time between jobs. No drives to connect. Conveyors swing easily into position.

When buying a crushing plant — buy the best — buy Cedarapids. If your requirements are moderate — buy a Pitmaster Straightline.

Iowa Manufacturing Company
Cedar Rapids, Iowa

Irrigation Canal

(*Continued from preceding page*)

ing from 2 to 4-inch diameters. This pipe was rigged to sprinkle the borrow pit ahead of canal and dike-building operations, and it served to reduce the dust as well as to dampen the borrow-pit material. Dampening the sand improved its loading ability so far as tractor-drawn scrapers were concerned.

Superintendent W. F. Rennebohm, an old friend of world-famous Frank Crowe and other pioneer irrigation men, is no stranger to this region, having worked several miles from the site of this job as a younger man. He knows the desert, he knows its material, and he knows present-day equipment. After making a study of this job, he calculated that about 12 feet was the elevation limit of fills for economical operation of tractor equipment. Setting that maximum elevation as the "knock-off" point for tractors, he directed that ramps be built for faster, higher-capacity machines.

Beyond the 12-foot elevation, a fleet of seven 13-cubic-yard Euclids was used. These were loaded by a Model 80-D Northwest shovel, using the flood-control area uphill of the dike as a borrow pit. Loading characteristics of this material were excellent, and five shovel cycles filled each wagon to its capacity.

Ramps were built up the dike slope on 600-foot centers to allow the Euclids to enter the fill. The backslope of this dike was built on a 3 to 1 ratio, and the Euclids made their own turnouts on about the same spacing as the ramps.

Wherever a ramp had been located, however, it was of course impossible to build the dike to its full elevation initially. Usually a swale was left there, and after the machines moved on to another section the preceding ramp was picked up by tractor-drawn scrapers. The swale was filled after the main body of machines had moved ahead.

Dike and canal earth work was kept ahead of lining by at least a mile, and a job road and the water pipes were kept ahead of earth work by at least 2,500 feet.

Density tests were run by USBR personnel on all compacted fills. Uncompacted fills were rolled to some extent by the passage of earth-mover tires.

Job Personnel

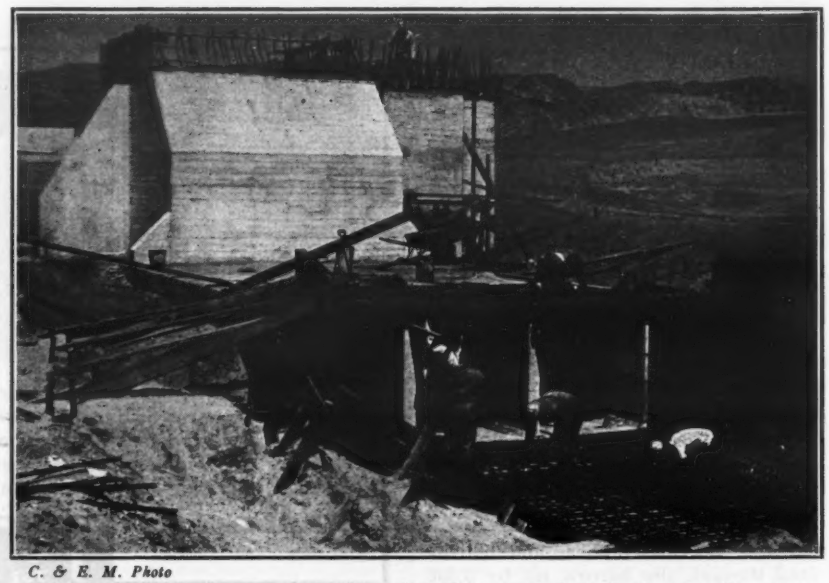
W. F. Rennebohm was Job Superintendent, with Henry Ewert as his assistant. W. C. Evans was Office Manager. Lloyd E. Owens was Concrete Superintendent, J. B. Hammond, Foreman in charge of structures, and J. A. Rein, Night Foreman. The contractor's earth-moving equipment was kept in an excellent state of repair by H. G. Cummins, Master Mechanic. The Shea Co. also had Grady Williams as Foreman in charge of tractor-drawn scrapers.

C. S. Hale is the USBR Division Engineer, and H. R. Voris was in charge of field engineering on the job.

Future of a Valley

Because of the porous sandy soil, all canals in the Coachella Valley will be concrete-lined. This 11-mile project was no exception. The concreting job (see accompanying article, page 2) was finished this month. Water has been advanced that much farther towards the rich land soon to be irrigated. And it *is* rich land, with a desert climate in which finest varieties of Arabian dates can thrive, transplanted.

Dr. Wozencraft should be alive today. His desert is already blooming. The USBR furnished the money, the plans, and the supervision. One of the west's outstanding contractors, the J. F. Shea Co., built this part of the job. But credit still properly belongs to the visionary doctor who furnished the dream in 1849.



C. & E. M. Photo

Several check structures and "water bridges" to carry flash floods over the canal were necessary. This is the main discharge structure to carry water from above the protective dike underneath the new canal.

Portable Drinking Water

The recently announced Superbilt portable drinking fountains are described in a brochure just issued by the Dobbins Mfg. Co. The fountain features a tilting-type bubbler. Copies of the circular are available on mention of this notice from Dobbins Mfg. Co., Dept. 523, W. Beardsley Ave., Elkhart, Ind.

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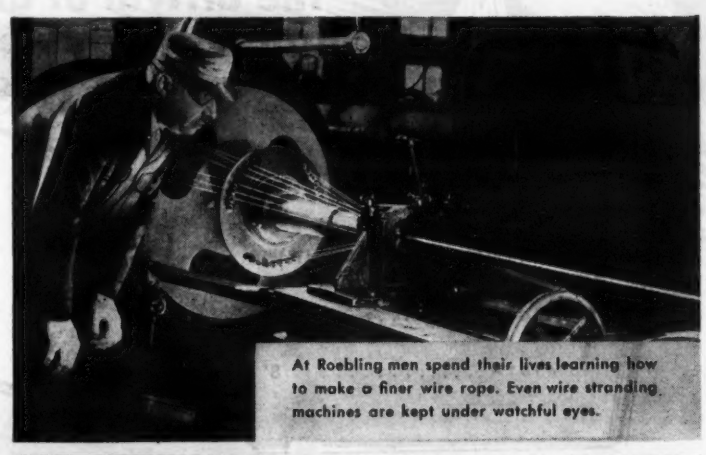
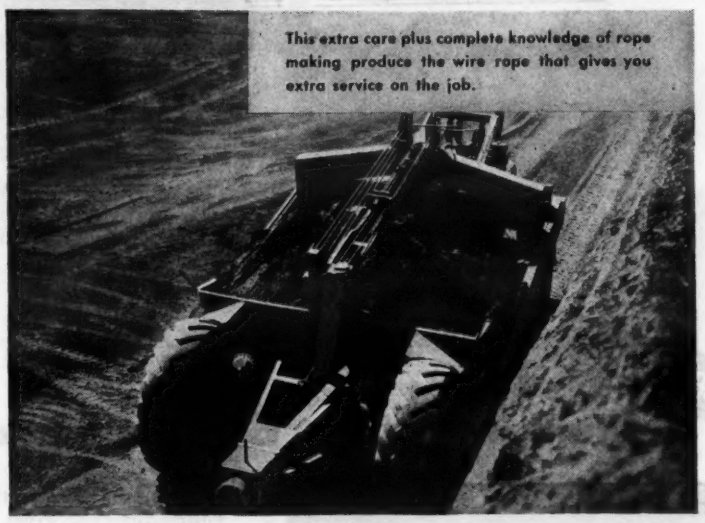
On any job: NOTHING SERVES LIKE
the right Wire Rope



At Roebling men spend their lives learning how to make a finer wire rope. Even wire stranding machines are kept under watchful eyes.



This extra care plus complete knowledge of rope making produce the wire rope that gives you extra service on the job.

TO GET THE BEST SERVICE . . . the most life from your wire rope, it's important to use the *right* rope for the job. You need the correct balance of strength and flexibility, plus the peak in fatigue and abrasion resistance. In the wide range of sizes and types of Roebling "Blue Center" Steel Wire Rope there is one that meets your exacting requirements.

Your local Roebling field engineer will be glad to help you specify the *right* wire rope—preformed or non-preformed—to give you the most service for the least cost. Call or write our nearest branch office.

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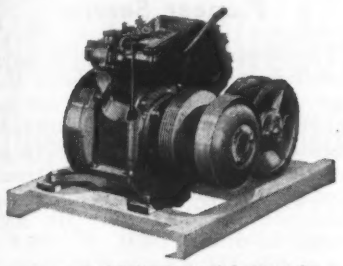

The new Salsbury Model 600 6-hp gasoline engine has varying drive ratios controlled by the driven unit and clutch engagement controlled by engine speed.

Six-Hp Gas Engine With New Features

The feature of the new Salsbury Model 600 gasoline engine is said to be the automatic operation of varying drive ratios in the engine's transmission. A completely automatic driving unit, in which drive ratios are controlled by the driven unit and clutch engagement is controlled by engine speed, is responsible. This 1-cylinder 4-cycle air-cooled engine is capable of producing 6.5 hp at 3,200 rpm, the equivalent of 1/3 hp per cubic inch of displacement. It is said to be especially advantageous in applications where high-starting torques or momentary overloading or underloading occur.

Automatic and infinitely variable ratios over a 4 to 1 range are produced by a coordinated assembly comprising a variable-diameter drive pulley, a variable-diameter driven pulley, and a V-belt. Drive ratio is controlled as a function of driven-shaft speed, making the unit a true torque converter, Salsbury explains.

In high-speed units, the normal overall reductions may range from 4 to 1 to 1 to 1. Heavy-duty low-speed requirements can be met in 200 to 1 to 50 to 1 ratios. Automatic change of ratio within these limits may be adjusted to suit the needs of the individual user. An automatic, centrifugally operated clutch of the opposed-shoe type is built into the Power Package's drive pulley. A horizontal carburetor with a short, straight intake manifold mounted on an inclined cylinder features the engine.

Full details about the Model 600 Power Package engine which weighs only 56 pounds, can be secured on request. Merely mention this news report when asking Salsbury Motors for Bulletin 4502. The address: 4464 District Blvd., Los Angeles 11, Calif.

Loud-Speaking System For Use in Construction

A portable sound system for use on construction projects has been announced by the Newcomb Audio Products Co. The unit weighs but 39½ pounds, and has been operated efficiently at distances up to ½ mile on land, and 2 miles at sea. It comprises an amplifier, battery, microphone, and loud-speaker, and requires 14 watts of current.

Contractors and dredge operators interested in further details about this portable loud-speaking outfit can obtain them on mention of this notice. Write the Newcomb Audio Products Co., 2815 So. Hill St., Los Angeles 7, Calif.

New Atlas Cement Office

A new sales office for Ohio and Kentucky has been opened by the Universal Atlas Cement Co. at Dayton, Ohio, following the acquisition, repair, and improvement of a plant at Osborn, Ohio. James C. McClure is Sales Manager.

Mr. McClure has been with Universal Atlas since 1927, and was District Sales Manager at Albany until his new appointment. He is replaced at Albany by Harry E. Bergold. Mr. Bergold has been a field man in Rochester and vicinity, working out of the Albany office.

Blue Brute Breaker Built in New Design

A redesigned pavement hammer, the WB-81 Blue Brute Breaker, has been added to its line of contractors' air tools, the Worthington Pump & Machinery Corp. has announced. New features have been built in to increase the performance, versatility, ease of handling, and durability of the machine, Worthington says.

Features of the new design, the firm explains, include a positive-action, end-seating, automatic valve that is not affected by wear; a large-capacity built-in lubricator; a fully cushioned piston; a heavy-duty, interposed anvil block that has a large striking surface; and spring-cushioned side rods. Forgings and alloys are used for all major parts, and all component parts are heat-treated. The cylinder is precision-ground, hardened, and honed.

Specifications for this new Blue Brute tool can be obtained by CONTRACTORS AND ENGINEERS MONTHLY readers. Write to the Construction Equipment Division of the firm at Holyoke, Mass.

CON-VAY-IT 12-20 CONCRETE SPECIAL

pours 2 yards of WET CONCRETE in only 3 minutes

Photo shows two American Conveyors in tandem doing this remarkable job for the A. V. Stackhouse Company, Contractors, of Indianapolis, Ind. Contract covered an addition to the Indianapolis Paper Container Co. where concrete was conveyed 35 ft. from truck to pouring point, with an elevation of 22 ft.

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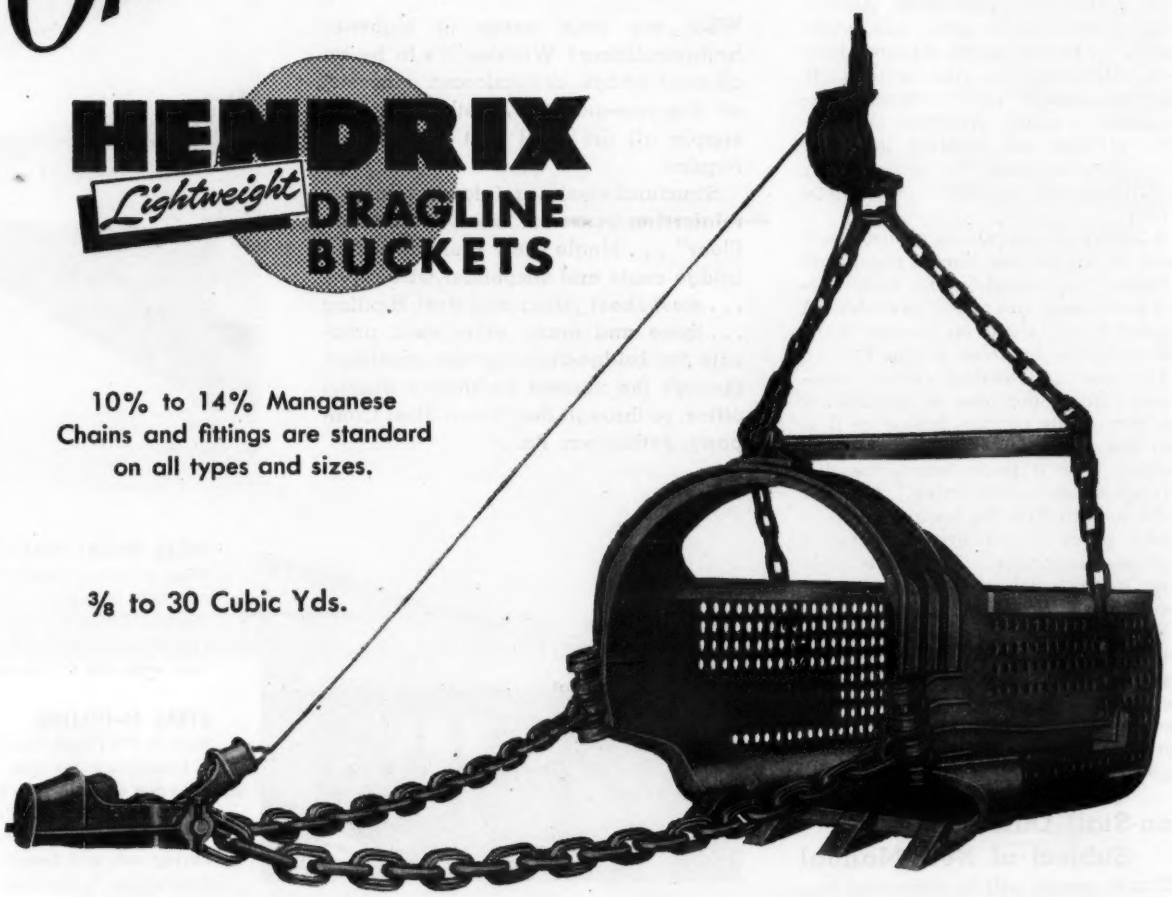
On the job--- DIGGING AT A PROFIT!

HENDRIX Lightweight DRAGLINE BUCKETS



10% to 14% Manganese Chains and fittings are standard on all types and sizes.

⅜ to 30 Cubic Yds.

We've taken the weight out of the bucket itself, to let you put bigger loads inside. Here's how: Because the HENDRIX Lightweight is 20 to 40 per cent lighter than other buckets, type for type, you can use larger buckets on your machines, designed for smaller operations. The same holds true for long boom operations... and in either case this can be done without exceeding the allowable loaded weight. In wet digging, you get bigger pay loads by leaving the water in the pit!

★ 20% to 40% lighter than other buckets, type for type.
★ All welded construction for greater strength and durability.
★ Manganese Steel chains, fittings, and reversible tooth points.
★ Full Pay Load every trip, even in wet diggings.
★ Perfect Balance; handles easier, fills faster, dumps cleaner.
★ Three Types; light, medium, and heavy duty. With or without perforations.

WRITE FOR DESCRIPTIVE LITERATURE— OR ASK YOUR DEALER

DESOTO FOUNDRY, INC. • MANSFIELD, LOUISIANA

A hand lubrication gun equipped with a gun-loader fitting is placed on the loader valve while the handle of pump is operated. This Alemite system of speedy economical gun loading is available in other loader pumps for containers up to 400-pound capacity.

No More Dismantling Grease Guns to Refill

The loading of hand lubrication guns, long a vexing and often wasteful task for depot mechanics and garage men, has now been speeded up by the Alemite Division of Stewart-Warner Corp. The firm has developed a device for filling the gun—without taking it apart—directly from a loader pump.

Said to preclude the danger of lubrication contamination and waste, this development permits quick loading. The possibility of air pockets in the filled gun is also eliminated, Alemite says. Several hand guns, and loader pumps up to 400-pound capacity, have been fitted with the new system. In addition, a loader valve to convert present guns to loader operation is available. It can be installed in either lever-type or push-type guns simply by drilling and tapping ⅛-inch pipe thread.

A loader kit, containing all necessary parts to convert any bucket pump into a loader, and including one loader fitting for a hand gun is also available. A bracket to hold a gun on the side of the bucket is also included in this kit.

The new gun-loading system comprises a fitting mounted on the head of the gun. This permits grease to flow into the gun's reservoir in the same manner that it flows into a bearing through a lubrication fitting. A loader valve mounted on the bucket pump or loader pump of the grease container matches this fitting. The valve functions in the same way that a coupler does when attached to a fitting.

Full details on these new shop lubrication units can be secured by highway department and contractors' shop men. Mention this notice when writing the Alemite Division, Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.

Non-Stall Differential Subject of New Manual

Truck owners will be interested in a manual on its automatic-locking differentials which has just been issued by the Thornton Tandem Co. Believed by the firm to be the first such publication in automotive industry, this booklet outlines the development of traction devices, and gives operational and maintenance data.

The prevention of one spinning wheel from stalling a vehicle is said to be possible with the Thornton differential. The firm claims it is the first major improvement in full-locking differential assemblies that has been offered the industry since its inception.

Data on construction and operation, installation, general maintenance and lubrication, assembly, disassembly, and servicing, together with lists of parts, constitute the major portion of the 32-page illustrated booklet.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can secure copies gratis by writing the Thornton Tandem Co., 8701 Grinnell Ave., Detroit 13, Mich. Just mention this news item.

Built-In Coupling For Flexible Tubing

The need for fittings is eliminated in a new simple coupling used to join sections of flexible ventilation tubing. Developed for Spiratube, a non-collapsible and retractable tubing, the coupling is said to be applicable in 10 seconds.

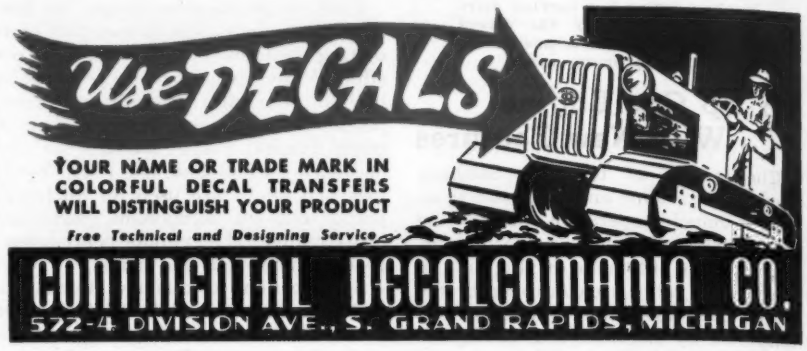
It is built into the end of the tubing and consists of a flat spring steel collar. This is compressed when the end of one section is slipped into the end of another. It is then released to form a strong, tight joint. To disconnect the sections, one merely presses the inner spring collar and withdraws the inserted end.

Like Spiratube, the coupling is covered with long-fibre duck fabric. This is fire-resistant and coated with a tough, durable thermoplastic. There is no exposed metal. Spiratube is furnished in diameters of 3 to 16 inches, and in 10, 15, and 25-foot lengths.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can secure further details on this new feature of Spiratube by writing to Spiratube Division, Dept. 24, The Warner Brothers Co., Bridgeport 1, Conn.

Pioneer Service

The consolidation of all its service activities under Harold E. Rollin, Manager for Sales Engineering, has been announced by the Pioneer Engineering Works, Minneapolis, Minn. This step has been taken in order to render prompt efficient service to Pioneer equipment in the field. Mr. Rollin joined the firm in 1929.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What are your needs in highway bridge-building? Whether it's to be an all-steel bridge, or reinforced concrete, or concrete-and-steel, Bethlehem can supply all the steel that the designs require.

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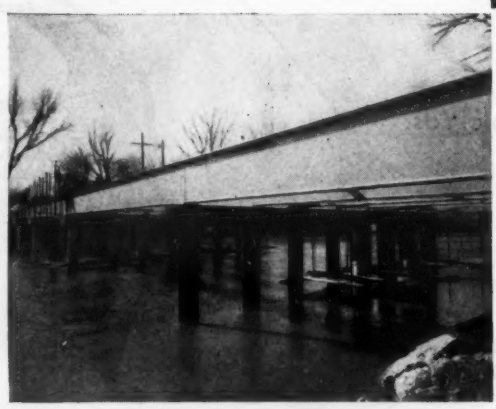


STEEL SHEET PILING

There are many applications for Bethlehem Steel Sheet Piling in the construction of highway bridges. Use it in temporary cofferdams, in the construction of bridge foundations, and in abutments and retaining walls. This piling is rolled in a wide range of sections, including straight, arch and deep-web, and Z-type sections.

STEEL H-PILING

Steel H-Piles have high column strength. They are used to best advantage in locations where they can be driven into hard ground material such as hard-pan or shale or to firm bearing on solid rock. In such cases extremely high bearing capacities can be developed.

Bethlehem Steel H-Piles are special wide-flange structural steel shapes having web and flanges of the same thickness. They are used in bridge foundations in the same manner as other types of bearing piles.

"BATTLEDECK FLOOR"

Steel "Battledeck Floor" is as light as timber but more durable than concrete. Where traffic is heavy or the bridge span of considerable length, the weight of the flooring will naturally be an important factor in the cost of the steel structure required to carry it. In such cases "Battledeck Floor" should be given full consideration.

"Battledeck Floor" has an advantage over other steel floors designed for lightness in that it is not composed of thin sections. It consists of standard rolled beams, placed lengthwise of the traffic, with a flat plate of substantial thickness welded over these beams. It is therefore assured of a life as long as that of the bridge which supports it.

Send Today for New Highway Steel Catalog

Bethlehem's new illustrated catalog, "Steel for Highways," gives complete information about Bethlehem road-steel products. Send for a copy today. Ask for Catalog 191, and address the nearest Bethlehem district office, or Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL

Cutter-Head Dredge Digs a Pilot Canal

Straightening of Missouri River to Be Aided by a Canal 60 Feet Wide and 7,400 Feet Long

✦ THE new dredge John S. Campbell is digging a pilot canal 60 feet wide and 7,400 linear feet long in the Missouri River, about 6 miles south of the town of Wakenda, Mo. Construction of this canal will allow the Big Muddy to cut a new channel close to the present left bank of the river, and will straighten the stream for future navigation.

The John S. Campbell, a 12-inch diesel-driven cutter-head type of dredge, was built by the American Steel Dredge Co. in 1944 for the U. S. Army. Cessation of hostilities with Germany caught the dredge completed and ready for shipment to the European theater of war, where it had been consigned. The Office of the Chief of Army Engineers then reassigned it to the Kansas City District for use on the Missouri River. For the past 10 years the District hired-labor unit had been digging pilot canals for stream realignment with draglines and 34-inch dustpan-type hydraulic dredges, owned and operated by the Army Engineers. It was believed that the use of the Campbell might be an improvement.

The Pilot Canal

The new canal, located in Malta Bend, was designed for a 60-foot width at the bottom, with 1 to 1 side slopes. Depth of the canal was to be 12 feet below Construction Reference Plane. It ran across an open sand bar which had a general elevation of plus 10 feet referred to the Construction Reference Plane. No willows or other growth was present. Approximately 400,000 cubic yards of material had to be moved in a distance of 7,400 linear feet. The material was composed of 95 per cent river-run sand and 5 per cent silt.

Two dumping sites were located not more than 2,000 feet from the center of the work. The first was on the left bank of the Missouri River along the new channel line. It was filled with material to build up the general elevation to a point consistent with future pile revetment and rock-riprap operations. The second dump site was along the right side of the bar in the present channel. It served only as an alternate when operations were unfavorable for depositing the material on the first dumping site.

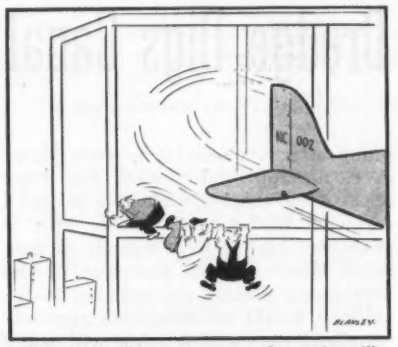
Dredging Operations

Work began in early November, 1945, after the dredge had been assembled in the Gasconade, Mo., boatyard and towed to Malta Bend. It was scheduled for completion this month. The center line, both toes, and the top of the slope of the pilot canal were flagged by a survey party, and the Campbell was set in on the center line of the cut.

Since dredging operations began at the downstream end of the canal, the upper end was protected by an earth plug. This was removed as soon as ice conditions permitted the opening of the pilot canal. No serious channel conditions existed around the dredge due to calm water. But the towing characteristics of the dredge and her floating pipeline have already indicated that her use in a fast-flowing current of an open river will be limited. Under each of her 40-foot pipe sections are four 36-inch-diameter x 12-foot pontoons, but they have shown a tendency to turn turtle in a swift current. The Mechanical Section of the District Office now has under way some field studies of possible remedies. These will determine whether it is better to make the pontoons longer by welding a section in the middle, or to build a rake on the forward end of each of the pontoons in order to streamline them.

A total of 2,500 linear feet of pipe line was brought in to Malta Bend. The maximum distance that sand has been moved was 1,800 feet, and 1,000 feet of this distance was shore line. However, under ordinary dredging conditions, the Campbell used 700 feet of floating line and 700 feet of shore line. Material was lifted an average distance of 10 feet above the water surface and deposited at an average rate of from 4,000 to 4,500 cubic yards per 24-hour shift. Effective digging time for November was 70.9 per cent. For December it was 68.7 per cent, since there was a considerable amount of rainy, inclement weather in that month. Because the dredge did not operate on Saturdays, Sundays, and holidays, they were not taken into consideration in computing the effective pumping time.

Wherever it was possible to do so, the two swing cables on the bow of the Campbell were fastened to a 2,000-pound steel anchor 10 feet long with



"By golly, it's not even safe up here!"

22-inch sand flukes. These anchors were lifted and moved ahead by means of a hoist-equipped anchor barge. Where it was not possible to place anchors, deadmen were dug on the bar on both sides of the dredge, and the swing lines were moved ahead by the labor crew ashore.

The abrasive quality of river sand made it necessary to re-line the dredge

(Concluded on next page)

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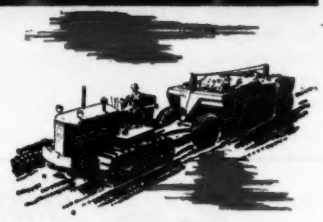

For sheer quality, you'll find it hard to beat the steering drums on an Oliver "Cletrac" crawler tractor. Made of the highest quality materials, drums are ground and polished to a high finish, providing maximum contact and longer life for the steering bands. They're another example of the *extra* quality built into Oliver "Cletracs."

The manufacturing knowledge of Oliver "Cletrac" engineers, the modern production methods, and up-to-date equipment plus experienced, capable craftsmen, permit the addition of these high quality design features without the penalty of added cost to the user. *Extra* quality is standard on Oliver "Cletracs."

Maintenance of this standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

CLETRAC OLIVER Cletrac

a product of **The OLIVER Corporation**

Dredge Digs Canal

(*Continued from preceding page*)

pump after 6 weeks of service. However, no appreciable wear has been apparent on the 5-blade 3-foot 10-inch-diameter basket-type cutter. This is probably due to its 7½-rpm turning speed. Studies which were run by the Mechanical Section showed that 16-fps velocity would accommodate approximately 18 per cent of solids within the discharge pipe. In normal digging the vacuum gage in the control house showed 15 to 20 inches, with 40 to 50-psi pressure in 1,350 linear feet of discharge pipe line.

The stern swivel connection was made up of four short sections of Goodyear rubber joint with a 30-inch piece of discharge pipe between each rubber section. This allowed the dredge to swing in excess of 180 degrees if necessary. Similar rubber sleeves secured by metal straps made up the floating pipeline joints.

The Campbell was kept on her ranges by the operator's eye, and the length of swing was controlled by the same method. She was not equipped with a gyrocompass.

Dredge Equipment

The Campbell has a steel hull 104 x 29 x 6 feet. Her draft forward is 2 feet 9 inches; her draft stern 3 feet 0 inches. Her maximum digging depth is 20 feet. Following is a list of main and auxiliary equipment aboard this newest addition to the fleet of Kansas City District dredges:

Main Power: a 320-hp Buckeye 8-cylinder 400-rpm diesel engine, with Bendix-Scintilla air injection, Alnor pyrometers, and Link-Belt bearing outboard of flywheel.

Air Compressor for Main Engine: a 300-rpm Curtis, 3 x 1⅞ x 3 inches, driven through a double Vulco V-belt by a 3-hp 220-440-volt Lima electric motor.

Auxiliary Compressor: driven by a Wisconsin Type-ABS 2½ x 2¾-inch gasoline engine.

Water Pump and Motor: a Master ac motor, 5 hp, 1,725 rpm, driving a Weinman 2½-inch 200-gpm single-stage pump.

Main Drive Coupling: a Falk flexible-steel coupling.

Main Motor-Generator Set: an 85-kw Caterpillar D17000 diesel engine driving a Louis Allis Type-ALT generator.

Heating Boiler: a Kewanee, 571 BTU/Hr., with 2,380 square feet of heating surface.

Hoist Motor: a General Electric, 220 volts, 90 hp.

Main Pump: an Amsco 12-inch right-hand Type HM-CF, with 14-inch intake, 12-inch discharge.

Auxiliary Equipment

Hoisting Engine: a 5-drum Amsco, which accommodates two spud cables ¾-inch-diameter, 6 x 19, 170 feet long; two swing cables, same construction, 500 feet long; one ladder-hoist cable, same construction, 230 feet long.

Oil Filter: a Hilco Hyflow for recovering lubricating oil from main power plant.

Water Filter: a Lynn.

Auxiliary Motor-Generator Set: a 7.5-kva Witte.

Dredge Performance

The following figures on dredge performance for the month of December indicate the average conditions encountered, and the dredge output:

Number of persons in dredge crew	38 to 51
Length of discharge pipe	592 to 1,275 ft.
Fuel oil consumed	8,220 gals.
Lubricating oil consumed	234 gals.
Grease used	138 lbs.
Average width of cut	60 ft.
Total advance	972 ft.
Amount dredged, total	118,625 cu. yds.
Effective dredging time (pumping)	313 hrs. 10 min.
Amount dredged per pumping hour	378.79 cu. yds.

Non-Effective Dredging Time

	Hours	Minutes
Handling pipe lines	39	00
Handling swinging lines	1	55
Clearing pump and pipe lines	9	35
Loss due to opposing natural elements	64	25
Minor operating repairs	9	50
Waiting for attendant plant	1	30
Preparation	15	15
Sundays and holidays	288	00
Miscellaneous	1	20
Total	430	50

New Electrode Aids Cast-Iron Welding

Cast-iron welding, always a problem for arc welders, has been made easier by the recently developed Ni-Rod electrode, the International Nickel Co. says in a recent release. Ni-Rod leaves a deposit that is both strong and machinable, and does so with a minimum of troublesome preparations or after-care, Inco states.

Made of nickel, the Ni-Rod deposit is described as stronger than the cast iron itself. The fusion of the deposit and the parent metal is said to be so thorough that it is almost impossible to knock loose a Ni-Rod weld or overlay.

Three fields of cast-iron welding exist for Ni-Rod. The largest is the general repair and maintenance of cast-iron parts and equipment, including the building up of worn surfaces. The second field is remedying minor flaws in new castings, and the third is its use as a production tool.

How Ni-Rod can be of use to readers whose job it is to keep present construction equipment in A-1 condition will be described by the Nickel Information Service of the International Nickel Co., 67 Wall St., New York 5.

Latin American Market

A vast market for all types of construction equipment exists among our Latin American neighbors, Manuel Correa, Sr., reported on his return from a sojourn of six months in fourteen of the nations "south of the border". Mr. Correa is Vice President in charge of exports for the Marvel Equipment Co., Chicago.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

The Biggest Little Hoists in the world for use where power is not practical, available, or sufficient.

½-Ton "Lightweight"	75 ft.	1/4"
5-Ton "General Utility"	250 ft.	1/2"
15-Ton Triple-Geared "Special"	1200 ft.	1/2"

With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
½-Ton 4 & 22 to 1	60 lb.	$ 50
5-Ton 4 & 24 to 1	110 lb.	75
15-Ton 4, 19 & 109 to 1	680 lb.	250

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put more in the Profit Pocket...

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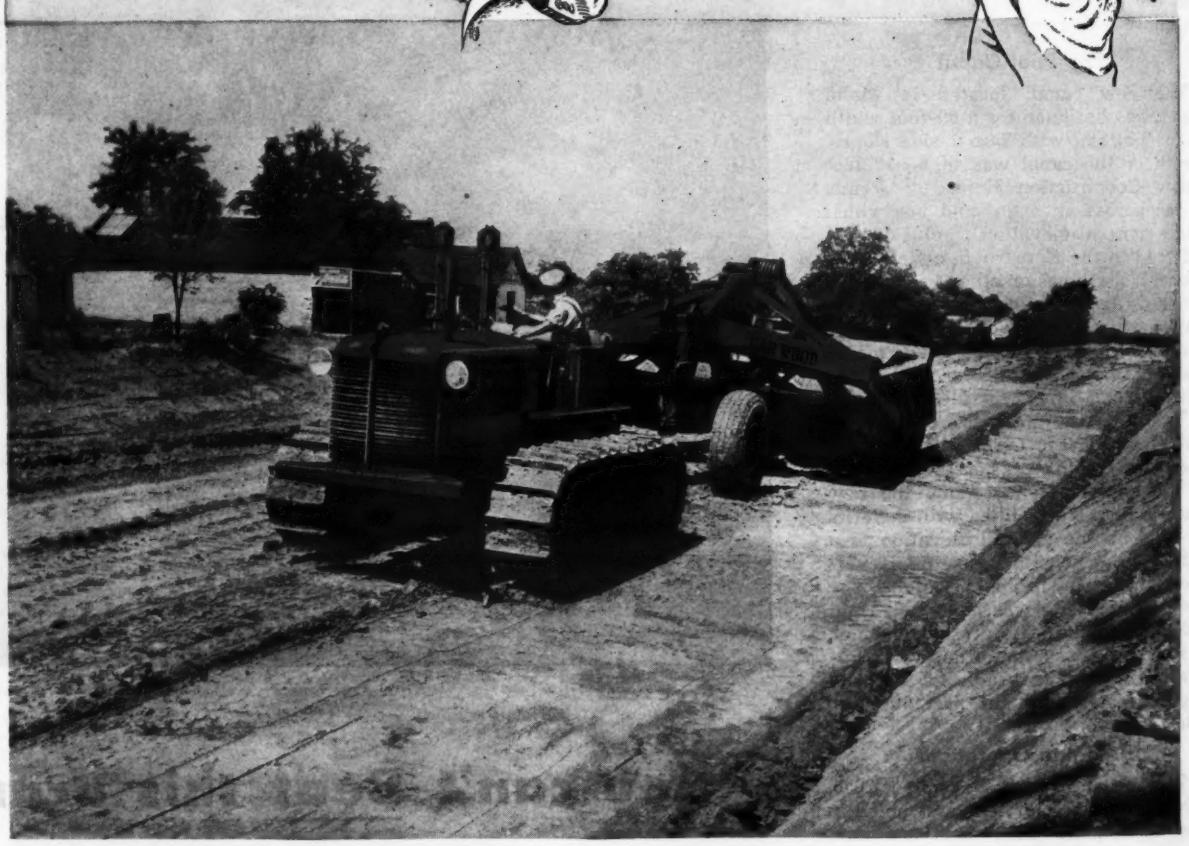

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LESS SHIFTING — Maintain high torque over a wide speed range . . . hang-on in tough going . . . less operator fatigue!

The way of all costs is DOWN with Allis-Chalmers 2-Cycle Diesel Tractors . . . the way of PROFITS UP!

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60 to 132 Drawbar H.P.

Portrait in Print

By RAY DAY

Francis Trenholm Crowe

✦ HIGH up on the red-walled bluffs a dozen jets of water broke with a roar. A dozen mammoth needle valves rolled open, and the water's roar reverberated through the gorge below the 726-foot concrete barrier.

A mighty river was tamed.

He stood on one of the mountains towering above even the highest ramparts of the dam—his dam—and he listened and smiled. This was it. This was the justification for his existence. All the dams before were preparation for this one job. All the rest would be an anticlimax. This was the fulfilment of a life's ambition.

He turned back to his well worn Ford and got in. As he drove towards the south, the sullen Colorado waters from the spillway valves closed like a clasp of fingers across the gorge below the dam. In a last defiance they obscured, in the rear-view mirror of his car, the concrete arch that would endure for 10,000 years at least, if not for all time, as a monument to this man.

* * * * *

Trenholmville, Quebec. October 12, 1882. Today a boy was born. His father hopes the boy will grow up to be a minister.

* * * * *

Las Vegas, Nevada. October 12, 1882. Flash floods on the lower Colorado River today sent the stream swirling to new heights. Indian superstition has it that this stream is ill-fated. Many lives will be lost in its waters. Much property will be destroyed. . . .

* * * * *

United States Bureau of Reclamation headquarters, 1924. The policy of the Bureau was changing, for no longer would it design and build its own dams. Design, yes. But build, no. Henceforth the building would be by contract.

He sat there at a desk and let a thousand thoughts run through his mind. The University of Maine, where he'd graduated with a Bachelor of Science degree in civil engineering. The Bureau when he'd joined it as a junior engineer, and worked on the design and construction of Jackson Lake and Tieton Dams. And Arrow Rock Dam in Idaho . . . finished in 1915 to set a new world's record for height.

But now, what?

A job on dam design, so that was it! No more building. No more muck, no more hard rock to blast, no more cement in his eyes. No more intimate friendship with some of the construction stiffs. Just a good, steady job with plenty of security.

He jammed his pencil point down hard on the desk top and strode, with the determination of a man who has just made a difficult decision, towards the office of his chief.

"I didn't join this outfit to draw dams," he announced. "I'm going to *build* them."

"Then that means . . . ?"

"Exactly. I'm quitting. What papers do I fill out?"

* * * * *

The big Montenegrin powder monkey was sullen. All day, men from the resident engineer's headquarters had been hounding him.

"Pedro," they'd say, and then they'd come back to repeat, "you're overloading that shot."

What could they know that he, Pedro, did not know about rock? Was he not a licensed stonemason? Did not the head man himself, whom he dearly loved, leave methods to Pedro?

"By gar, my boss say to break all the way to slope line," Pedro muttered to himself. He crimped another cap between his teeth and jammed more powder down in the hole. Glaring at his hecklers, Pedro thought, "I work for *him*, not them. *He* tell me to break to slope line. So, by gar, I goin' to break there. Maybe I go even just a leetle bit more. Maybe it please the boss. To them I say, 'Sorry. Too bad. She just a leetle softer rock than Pedro believe.'"

* * * * *

High on a jackhammer scaffold on a rock face, two drillers sank holes in a bad outcrop.

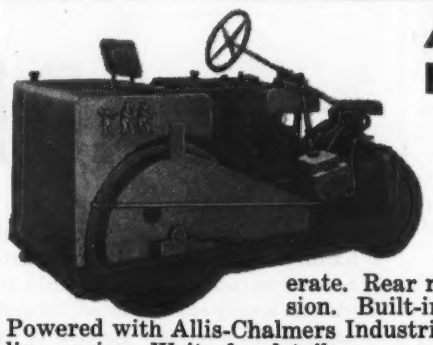
"Sumpin's wrong," said one. "The Old Man's down there. He ain't never around when things are goin' right, but he's been hangin' around for the last couple hours."

"Yeah. They's some guys here on the job that call the Old Man a slave driver, but you know, I kinda like to work for 'im. He don't ever take the long way around to do a thing."

The driller clamped a short piece of steel in the air gun and braced himself to start a new hole.

"Hey, up there!" came a bellow from

(*Continued on next page*)



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Gulf Quality Lubricants and Fuels help Atlas Construction Company get maximum job efficiency under tough operating conditions

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That is why Atlas selected Gulf quality lubricants and fuels for their two Mississippi Levee projects, which they completed well ahead of schedule. Both were a grueling test for men and equipment. On one of the jobs, at Bougere, upwards of 8,500,000 yards were moved—the largest single levee project ever undertaken on the Mississippi River.

The Atlas Construction Company, and many other leading contractors, have formed the habit of using Gulf quality lubricants and fuels as basic profit insurance. They know that Gulf products help speed up the job—keep operating costs at rock-bottom levels.

Call in a Gulf Service Engineer before you start your next job—he will help you complete it more quickly and at a larger profit. Write, wire, or phone your nearest Gulf office today.

GULF

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Division Sales Offices:
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Frank T. Crowe

(*Continued from preceding page*)

below. "Be careful, or you'll break your damn neck!"

"Well, it's *my* neck, ain't it?"

"It is until you break it," shot back the Old Man. "After that it's mine!"

* * * * *

Guernsey, 1927. Bear River, 1928. Deadwood, 1930, and Van Giesen. All of them dams, each with its own problems. Now 1931 and this one to be built, the culmination of them all. This was the one he really wanted to build. This was his life's ambition.

The performance bond was higher than he had dreamed. Higher than the company, whose estimate he had prepared, could afford. But the mind which had conceived so many special machines for doing the impossible now set to work on a business problem. Why not band together one or more other good construction companies, and thus handle the deal jointly?

But several were chary. This new Hoover Dam, higher than anything man had ever attempted, posed too many insurmountable problems. How could the river be diverted? How could the sheer rock cliffs be blasted and haul roads established? How could concrete be poured?

The quiet, confident, unassuming man had an answer. Divert the river through drilled tubes. To start with, blast the walls from drill barges. Swing concrete in from a cableway, or pump it.

Who had ever heard of pumping concrete?

This man had visualized it. He promised to show them.

"What will be your anticipated margin of profit?" they wanted to know.

The answer was this: "Gentlemen, you can figure the cost, add your profit and a sizable percentage to take care of any mistakes you may have made, and then turn in that amount.

"Or, on the other hand, you can bid at your figured cost on the theory that you're smart enough to cut some corners and make a substantial profit. And that's the way we're going to bid Boulder Dam!"

* * * * *

One afternoon the Old Man called a conference. Boulder was fairly well advanced; even ahead of schedule, on the whole. But the last few days the job had been lagging. Not perceptibly, but things hadn't been meshing the way he thought they should.

When all the foremen and walking bosses were together, he moved into their midst. His clothing was rough. A straw hat shaded his ruddy face and a necktie was knotted loosely on the collar of his shirt.

"I thought I hired dam builders," he began abruptly. "This last week I've had my doubts.

"Let me tell you guys this: Anybody can build a dam with enough money and enough time. I don't have to tell you that we can't operate that way. We have to *move*, men. We've got to have more concrete faster. We've got to do better next week and the next and the next. Now if there's anybody here who can't stand the gaff, let him step out."

Not a man moved.

With whimsical love for his construction stiffs showing only in his eyes, the Old Man left the room.

Concrete production jumped. At once.

* * * * *

Parker, Arizona, 1939. Parker Dam. A little chunk of concrete rising out of the river; not a very impressive sight to the casual visitor.

And yet, he knew in his mind that even after Boulder this was a tough one.

His men had gone 235 feet down below what you could see from up on the hill. The consulting engineers had said it couldn't be done. But his men, some of whom had been with him now for 35 years, had done it. Deeper than man had ever before dug to find bedrock, his hard-rock stiffs had finally struck the foundation which would hold Parker Dam.

(*Continued on next page*)

Only ADNUNS lay them all!

ADNUN Black Top Pavers' ability to handle a wide variety of paving and spreading jobs multiplies profit possibilities for every road-builder. Simple, easily understood one-man operation, hydraulic controls for all main paver operations, and built-in strength to handle the toughest work loads pay out in smoother running jobs and better finished roads. Road-builders who have used other black top pavers report Adnuns lowest in maintenance and operating costs... Names of these men in your area furnished on request. Get full details from your Adnun Distributor, or write direct for the new, complete Adnun Paver Catalog.

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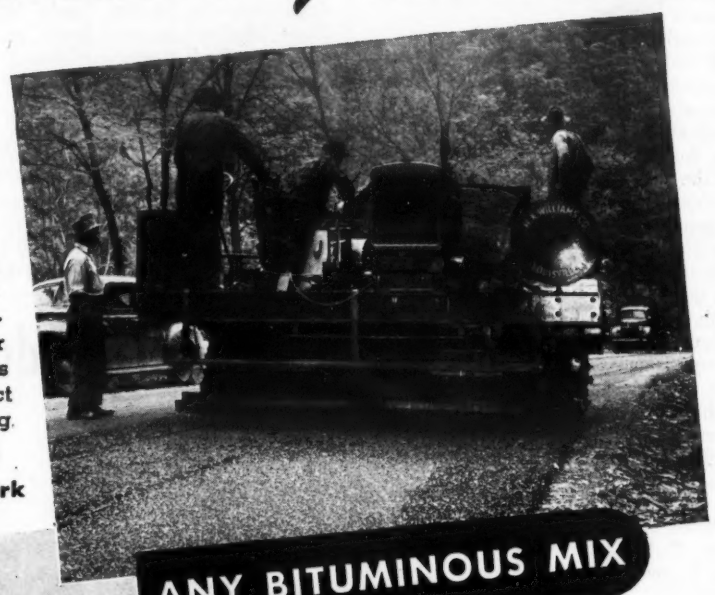

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Hot or cold, stiff mixes or light, Adnun Black Top Pavers handle any bituminous material—put down black top fast and accurately to any specifications required. Continuous Course Correction and crowding-compacting cutter bar give smooth finished paving, tight joints and uniform compaction.

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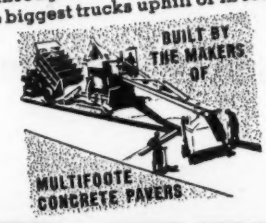

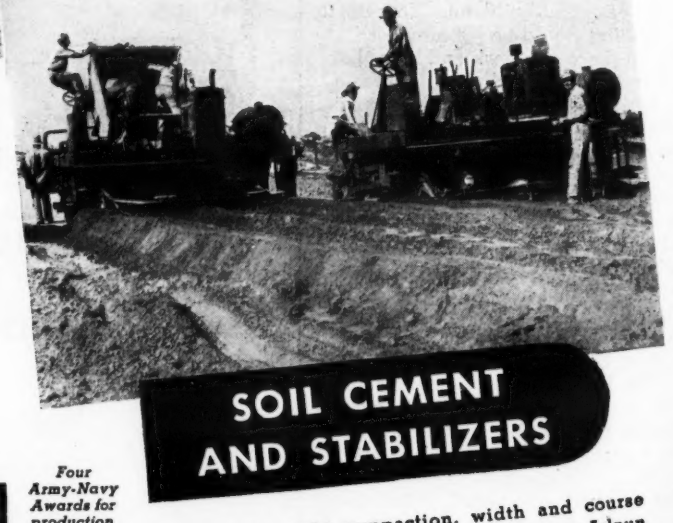

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Get the right compaction, width and course thickness as soil cement is laid with your Adnun Pavers. One machine does the job at a single pass per course to give you better roads at lower costs per mile.

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BLACK TOP PAVER

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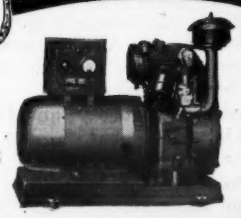

SIMPLE—DEPENDABLE—RUGGED
WRITE FOR LITERATURE

STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City

Frank T. Crowe

(Continued from preceding page)

But when the tremendous hole was opened up deep in the river bed, all hell broke loose. Flash floods poured down the Bill Williams, temperamental tributary of the mighty Colorado. A storm broke over the Colorado watershed. The river rose: brown murky water, lapping at the edge of the levee which trained it towards the diversion tubes.

He stayed with his men, not for hours but for days, sharing sandwiches and coffee in the lulls; fighting the river with all the cool consummate skill and courage that were his. His men rescued a human being headed for certain destruction in the diversion tubes. They watched houses, pieces of barns, and a pair of screaming horses be swallowed up in the rock-walled maelstrom.

He saved his man-made foundation excavation. Saved it from flooding, from filling with sand and silt. He saved his equipment. But not without cost. For a great river left its mark on him that time.

And while they filled that hole with concrete, in temperatures of 135 degrees between the rock walls, he stayed with his crews when the going was rough. On an occasional week end he went home to his family. But for days on end he took what Parker Dam had to give. During the terrible summer heat of two years, the mighty Colorado sapped a little more of his vitality.

* * * * *

The year was 1946, and for just a moment the man stopped to say hello to one of his acquaintances, a young man with great possibilities. The ruddy friendly face of the builder wrinkled in its familiar friendly smile. "How's it going, Johnny?"

"Well, pretty good, I guess. But you know, somehow I don't like construction work. I got my mind set on owning a business of my own. What would you do if you were me?"

What the lad heard was the message closest to this great builder's heart.

"Do what you want most to do," he said. "Do what you *like* to do. If you don't, you'll likely be a failure at whatever you're pushed into trying.

"Years ago, my father wanted me to be a minister. I thought I'd compromise with him and be a doctor . . . maybe do a little good for humanity that way. Well, luckily for all of us, my sister decided to go to college, too. So in order to fit in with the family's means, I went to the University of Maine and I took what I'd always wanted to take—engineering. If they'd had enough money to make me into a doctor, probably I'd have hated it so much I couldn't even have traced the circulation of the blood.

"So if you want your own business, Johnny, go get it. Keep your goal always in your mind. You may have to juggle it around a little, shape an end to fit the means and the other way around. But if you're happy doing a thing then you just can't miss. Let me know from time to time how you make out, and say, Johnny, if you need a little cash to get started . . ."

* * * * *

Redding, California. February 26, 1946. Shasta Dam finished.

In a lovely ranch-type drawing room that overlooks Redding and faces Mount Shasta, a beautiful and intelligent woman is writing at a desk. The blue eyes in her good-humored face are concentrating on a letter to one of her two daughters.

"Dad has gone with Mr. Greeley out to Kortes Dam. Let us hope his estimate there meets with the same luck as at Davis. . . ."

In an hour or so her husband will be back. She raises her head and looks about her. The walls of the room seem to reflect so much of him. There is his diploma from the University of Maine, and over here an honorary membership in The Moles, awarded in New York in February of 1945.

And there are the reference books he uses sometimes, though he is never as proud of his erudition as he is of being "just a plain construction stiff".

Frank Crowe, famous builder of dams, at Shasta. Mr. Crowe's death last spring saddened the entire construction industry.

Far off, towards the mountains, lie the 15,000 acres of cattle ranches which he has purchased in order to raise Herefords. In Washington, Government officials are ruefully contemplating the fact that the Herefords mean more to him than a job which he has refused—directing all reconversion work in American-occupied Germany.

"Perhaps if I were 25 years younger . . ." he explained to them.

There on the far wall are pictures of his two daughters, Miss Bettee and Mrs. Stanley Lee of San Francisco. It is this side of him that is apart from his public life. It is this part that he has kept sacred and inviolate.

The woman at the desk thinks of life in construction camps, and the friends her husband has made. She remembers with a twinkle in her eye how he used to pick up children on the way home from work, and give five or six a ride in his Ford. She remembers the time in Yakima when he wound up

(Continued on next page)

LANSING

WHEELBARROWS

CONCRETE MIXERS

DRAG SCRAPERS

Lansing Company
LANSING, MICH.
SINCE 1861

PMCO

America's Most Complete Line of Material Handling Buckets

All purpose-

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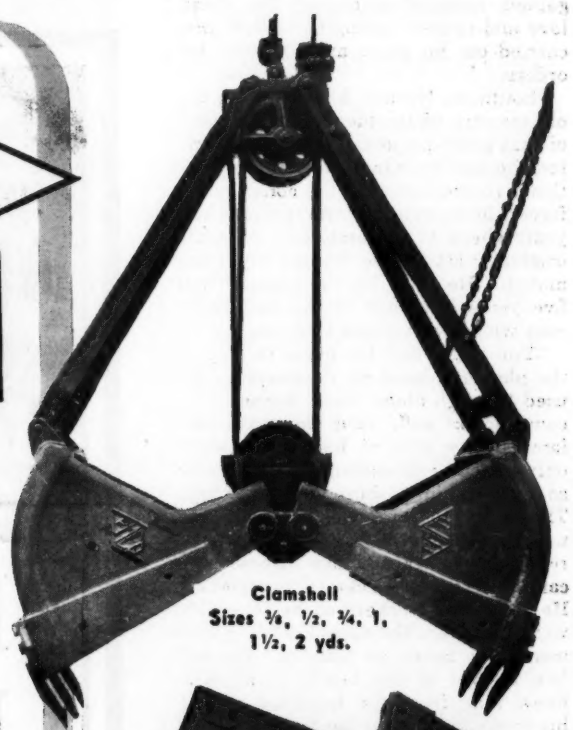
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

• FRONTS, BOTTOMS, SCOOPS and TEETH are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

On the ½ yd. and ¾ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable — a great advantage to operators.

Experience Counts

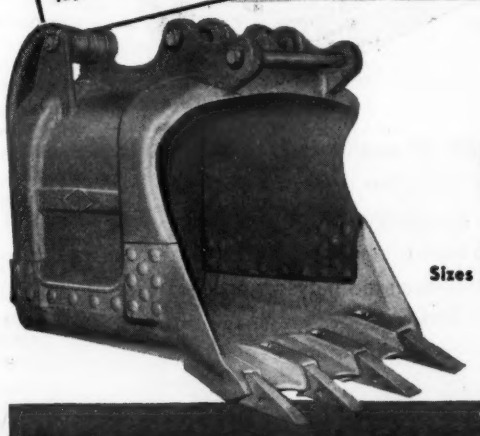
See your shovel man or equipment dealer about PMCO Buckets and Dippers.



Clamshell
Sizes ⅜, ½, ¾, 1, 1½, 2 yds.

Pullshovel
Sizes ⅜, ½ and ¾ yd.

Dragline
Sizes ⅜, ½, ¾, 1, 1½, 2, 2½ yds.



Shovel
Sizes ⅜ to 18 yds.

"Quality Since 1880"

PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

Frank T. Crowe

(*Continued from preceding page*)

with six of these youngsters at a Rotarian dinner, and how the Rotarians gave him choice circus seats for all hands.

In an hour this man, who somehow has never grown beyond boyhood but who is reserved without being pretentious, will be home. . . .

* * * * *

February 26, 1946. In an office of the Las Vegas *Evening Review-Journal,* columnist A. E. Cahlan jerks a piece of ticker tape to keep as a remembrance and turns to his typewriter. The words, under the column head "From Where I Sit", start to pour on paper:

"He was one of God's noblemen. I know of no man that phrase more completely describes. Perhaps the greatest builder of dams in the world, he was one of the humblest of humans. In forty years of construction work he had gained recognition among the great, love and respect among the toilers who carried out his plans and executed his orders.

"Southern Nevada knew him as the old maestro of Boulder Dam, the spirit of that great project, its inspiring genius, the guiding hand behind the sensational record made by the construction forces in completing the project two years ahead of the ambitious schedule originally set by the Bureau of Reclamation. He came here a stranger; left five years later one of the best-loved men who have builded with us.

"You won't find his name on any of the plaques placed on the project. He used to laugh about that. 'I was just a construction stiff,' he'd say, with that familiar dry grin of his which, while only a facial expression, seemed to give so much of him to those who knew him. The term, to him, was exalted. He used it frequently—always, however, referring to those men whose toil carried great projects to completion. He loved his workers as he loved his work and life. The dams are his monument. He needs no plaques. He will live forever in the hearts of all who knew him, from the humblest among his crews to those in the highest places.

"I have never known a man with such a breadth of understanding. It extended from people to intricate problems and back to people again. I have seen him in the midst of labor disputes when he felt he was getting a raw deal from persons he knew were professional agitators and troublemakers. They knew he knew it, and it seemed they beset him because they loved to do battle with him. They always lost, but somehow they seemed glad they did.

"He never could understand how his men could be taken in by these agitators, yet he never blamed them. He was indulgent and sympathetic. He'd razz them vigorously for being so foolish as to believe the interlopers, then lend them enough to tide their families over for the days they were off work protesting this or that or something else.

"I'll never forget the one big dispute during Boulder Dam construction. He went through another battle with familiar adversaries, playing the game carefully and astutely as he would a poker hand. When he knew he had set the stage for final victory, he invited his workers back to the job. Then he took up a position atop a hill near the turn in the Boulder City-Las Vegas highway to await results. He knew they'd come back, and yet he thrilled way down deep when the first carload rolled by.

"They waved to him and he to them. All was forgiven. They were just part of his big family of 'construction stiffs' who had strayed from the fold temporarily. but couldn't stay away. He never bawled them out or attempted any of the reprisals that many a less-understanding boss was wont to do in those days. He welcomed them back as errant children. He understood. That's why so many of his men always called him 'Father' as a nickname.

"I have seen him in tense situations when nature overwhelmed him with unexpected whims and tore away at the superstructure of his entire program. You'd never know a crisis was at hand. He was just the old master, thoroughly enjoying an unexpected tussle. He was in the midst of his men, barking orders, urging, driving, cajoling. He knew exactly what should be done and never missed. He was always with his crews during important phases of construction. He was one of them and shared the big moments. He used to love to watch the efforts of the concrete gang to get more mud into the canyon than the men there could handle. It meant speeding up the work, true, but to him it was a contest and how he enjoyed it!

(*Concluded on next page*)

STAY IN THE LEAD

By using the

HI-WAY MODEL R MATERIAL SPREADER

Reversible transmission on both the feed roller and agitator permits changing from forward to reverse motion, or vice versa, by simply shifting a lever.

The Swivel-type Adjustable Hitch allows the traction wheels of the Spreader to be on the ground at all times regardless of what position the truck or spreader is in. Easily coupled and uncoupled.

Disengaging lever for coupling and uncoupling is extended to the outside of the spreader, eliminating danger for the operator.

Furnished in 6 widths—from 8 to 13 feet

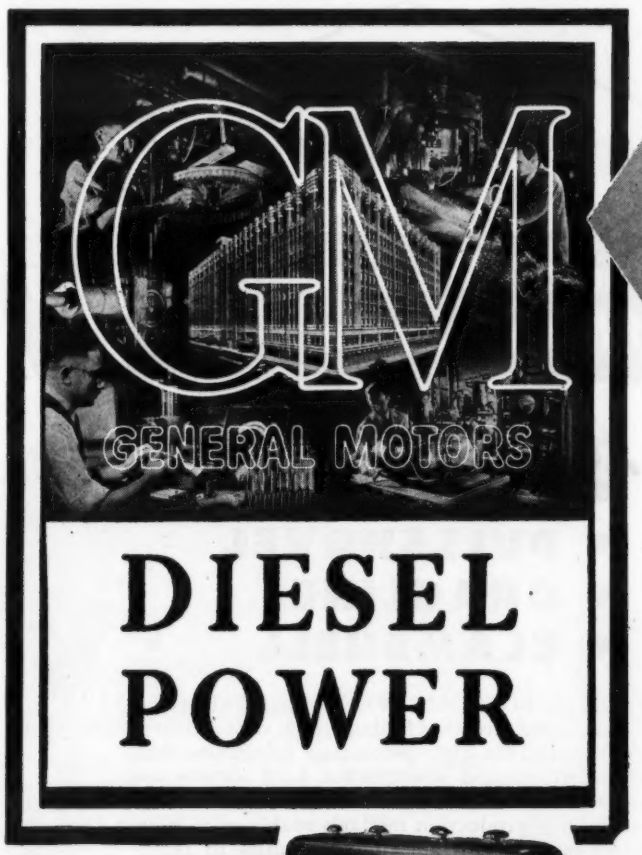
Sold and distributed by leading Construction Machinery Dealers throughout the United States and foreign countries.

Write for detailed specifications

HIGHWAY EQUIPMENT COMPANY, INC.

Manufacturers of the World's Most Complete Line of Spreaders

CEDAR RAPIDS, IOWA, U.S.A.



DIESEL POWER

FEATURES of the GM "71" DIESEL

- Compactness
- Quick starting under all conditions
- 2-cycle, smoother operation
- Easy accessibility of wearing parts
- Unit injectors—no high-pressure piping
- Maximum parts interchangeability regardless of number of cylinders
- Uniflow performance at high altitudes

WHAT'S IN A NAME PLATE?

IN THIS CASE the name plate holds the secret of the satisfaction you will have with Diesel power.

For this name plate is evidence of some of the most intensive work ever undertaken in the General Motors Research Laboratories.

It started back when all Diesels were cumbersome, stationary engines. But the Diesel idea looked good. Maybe it could be made more useful. So GM experts went to work on it.

THEY MADE IT two-cycle—quick to respond to additional loads because power is furnished on every downward stroke of each piston. They eliminated all the old surplus weight and size of former Diesel engine practice and built in a more than ample supply of horsepower. They developed unit injection—did away with high-pressure fuel tubing. They designed Uniflow scavenging—made a clean-burning, efficient engine. Then to top it all, they simplified the design and made wearing parts easy to get at, and interchangeable even between engines with different numbers of cylinders.

ALL THIS has added up to today's sturdy, hard-working, money-saving GM Diesel—a Diesel that brought the era of the GM locomotive and its streamliners, a Diesel that has changed the picture of marine propulsion—a Series "71" industrial Diesel engine ready to take on the toughest jobs of road transportation, construction, fishing, mining, lumbering and anything else you have to offer. Yes, ready to take them on and do them reliably, at low cost.

A nation-wide organization of GM Diesel sales and servicing dealers stands ready to handle every need for parts and service.

DETROIT DIESEL ENGINE DIVISION

DETROIT 23, MICH. • { SINGLE ENGINES . . Up to 300 H.P. / MULTIPLE UNITS . . Up to 800 H.P.

GENERAL MOTORS

Frank T. Crowe

(Continued from preceding page)

He'd seen his men at their best, and that's what intrigued him.

"Never a man hurt but it stabbed him deeply. It seemed so unnecessary that anyone should be injured or killed, yet he knew it was inevitable. Though he was proud of the construction record at Boulder Dam, he was prouder still of the safety mark established which, at that time, was far and away beyond any other job. He knew what it meant for men and families when accidents happened, and he worked unceasingly to eliminate all hazards.

"The count on his dams ran up to 19, but to him there was only *one*. The Boulder Dam was *his*. Everything before that was preparatory. Subsequent projects were easy, compared to Boulder. When the talk first started about building this project, he determined to build it.

"He always said as he viewed pictures of the executives of the six companies, 'There are the greatest gamblers in the world.' I used to wonder who really deserved that appellation. They knew their man and had complete confidence in him. It seemed to me that he was the gambler, and he never lost.

"He always contended the way to pour concrete was with cableways and buckets. At Boulder Dam he had a perfect set-up, with sheer walls rising on both sides, making perfect anchors for the nine or more cableways. At Shasta, however, there was only one suitable wall. On the other side of the river the country was rolling. That didn't stop the old maestro. He spent more than $500,000 building a tower on the other side to anchor his cableways. His company executives told him he was crazy. But it worked, as did all the other innovations he introduced into construction methods while he was building dams.

"The only serious argument we ever had concerned an article in this column in which I wondered what he'd find to test his genius when Boulder Dam was done. It seemed to me he undoubtedly would finish his career as a consulting engineer, and I pictured him in a suite of offices high in a San Francisco skyscraper, imparting to others some of his skill in an advisory capacity. He couldn't get to a telephone quick enough to challenge that statement, insisting he was 'just a construction stiff at heart' and would 'always keep his feet in the dirt'.

"When he first appeared in Redding to start the Shasta Dam, he was walking down the main street one day with the mayor of the city. After they had gone four blocks, the city's chief executive remarked, 'My goodness, man, you know more people in this town than I do, and I'm the mayor!' His workers were flocking to the spot from the four corners of the land. They heard he was on the job and knew there'd be a spot for them. 'They never hit me for a job,' he would say; 'they just ask me when they go to work.'

"He didn't add it, but he knew full well that was the spirit of his organization. Despite the fact that they were wont on occasion to call him 'slave driver', they loved him with a deep and abiding affection, and they'd rather work for him than anybody in the land. He reciprocated that feeling. He liked to get big jobs so he could take care of his 'boys'. He knew them all by their first names, thousands and thousands of them. And he gave them all every opportunity for a better job. One of his proudest achievements was training the son of a humble craftsman through many construction jobs to the point where he became his right-hand man on Boulder Dam, and later superintended projects of his own."

Cahlan glanced again at the ticker tape. It read: "Francis Trenholm Crowe, the greatest dam builder of them all, died this afternoon of a heart attack . . ."

Word spread through Las Vegas. A husky, gnarled, unshaven man burst into Cahlan's office.

" 'Tain't true, is hit?" he asked.

"Yes, I'm afraid so," said Cahlan. "Frank Crowe just passed on."

The man's eyes filled with tears as he said, "I worked for him on Boulder Dam." He turned and walked away, weeping unashamedly.

* * * * *

In the United States are a man's 19 dams. One of them is a monument. . . .

Peck Heads Sika Sales

E. J. "Al" Peck has been appointed Sales Manager for the Sika Chemical Corp., Passaic, N. J. Mr. Peck is former Sales Manager for the Hilty Forster Lumber Co., Milwaukee, and was associated with Johns-Manville for a number of years.

CUT HOURS TO MINUTES . . .

ATKINS *Chain Saw*

SQUARE OR MITRE HEAVY TIMBERS IN A FRACTION OF THE TIME REQUIRED FOR HAND SAWING

Ideal for Easy One-Man Sawing

Heavy construction material such as piling, logs, bracing timbers and planking fall easy prey to this modern sawing device.

Light enough for one-man operation, this Atkins WX-25 Chain Saw will cross cut or mitre any kind of timber or lumber. It cuts the time on heavy sawing jobs to minutes, adding critical man hours to the working day.

The self-contained, compact power plant can be mounted on skids or wheels and is easily portable. The cutter bar unit with power head weighs only 52 pounds. Write today for the Atkins Chain Saw Bulletin to learn how you can lower your current construction costs.

E. C. ATKINS AND COMPANY
Home Office and Factory: 402 South Illinois Street, Indianapolis 9, Indiana
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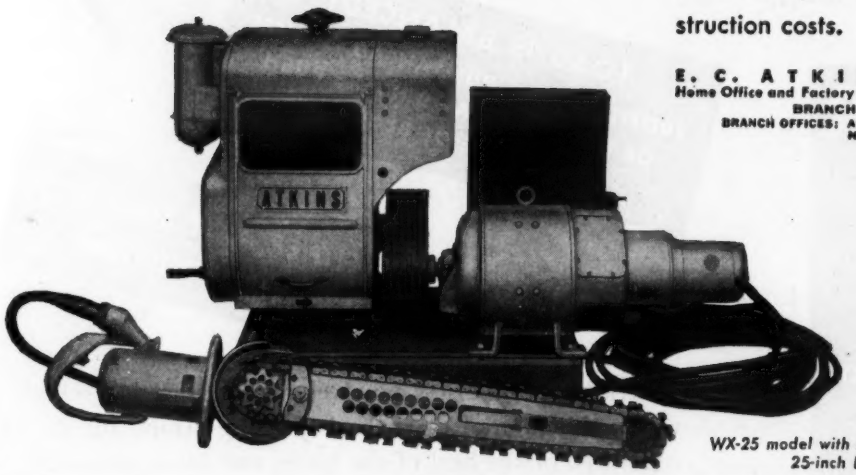

WX-25 model with 5 H. P. power head and 25-inch BA cutter bar

ATKINS

On most jobs When Excavating is Necessary

You'll most likely come face to face with one or more Owen buckets, should your travels take you to an excavating job.

The reason why is most simple, for consistent superior bucket performance by Owens is responsible for their widespread use and acceptance.

Bring your equipment catalog files up to date NOW by requesting your copy of the latest Owen Catalog.

A MOUTHFUL AT EVERY BITE

The OWEN BUCKET Co.
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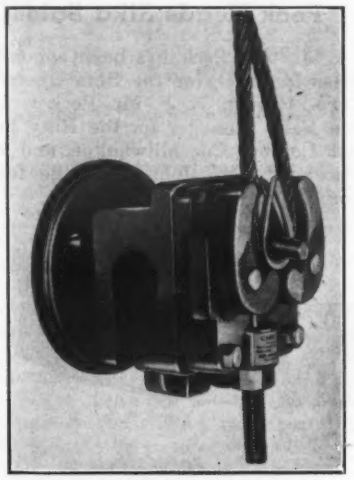
Branches: New York Philadelphia Chicago Berkeley, Cal.



By turning one nut with an ordinary wrench, the Cabl-Vise forms a loop of wire rope.

New Vise to Form Loops in Wire Rope

Forming a wire-rope loop merely by turning one hex nut with an ordinary wrench is said to be possible in a new vise that has been put into production by the Nunn Mfg. Co. The vise automatically compensates for rope sizes within its designated range. It is said to hold the loop firmly throughout splicing or clamping operations.

A swivel base accommodates the vise in either vertical or horizontal position. It rotates through 360 degrees, clamping firmly in any desired direction. Cabl-Vise No. 1 handles rope sizes ¼ inch through ½ inch. A larger model, No. 2, will be announced shortly. It will handle ⅝ to 1½-inch rope, and will have a hydraulic booster.

A circular with full details on the new Cabl-Vise can be obtained by writing the Nunn Mfg. Co., Evanston, Ill., and referring to this item.

Jaw-Crusher Bulletin

Overhead eccentric-type jaw crushers, the WRB series, are featured in a new bulletin issued by the Universal Engineering Corp. These units have welded steel-plate bases and SKF roller bearings. They are made with jaw openings of 10 x 16 inches, 20 x 36, 24 x 36, and 30 x 42.

Write to the firm at 620 C Ave., W., Cedar Rapids, Iowa, and ask for Bulletin No. 4. Mention this report.

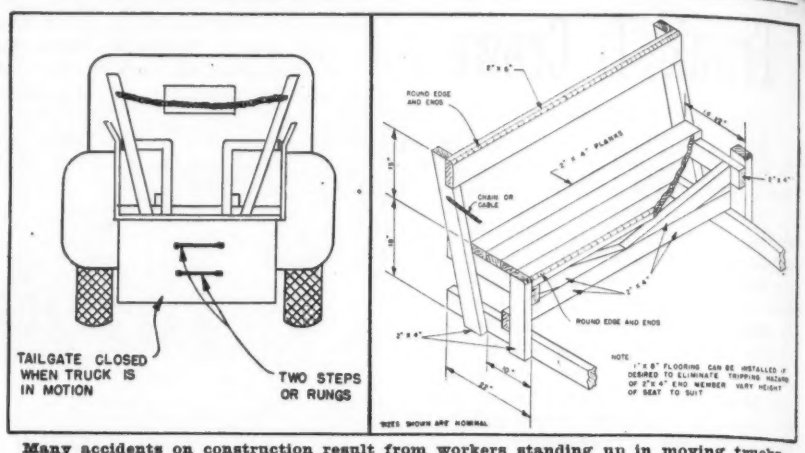
Light-Duty Engine Is Gasoline-Driven

Many tools and small pieces of equipment used in construction and highway operations can be powered by a light gasoline engine such as the one just announced by Fox Industries, Inc., an affiliate of the Rogers Diesel & Aircraft Corp. Known as the Fox Type A, the engine is a single-cylinder unit operating on the 2-cycle principle.

It has a 3-port design, with no valves, tappets, camshaft, etc., to give trouble or develop vibrations, it is stated. Unusual crankcase compression and special crankcase seals are combined to produce high output. A special carburetor also has been designed.

Lightweight construction, (the engine weighs only 15 pounds due to extensive use of aluminum castings), as well as a special ignition system and silencer are among other features of the Type A. The engine is offered with or without a 2 to 1 reduction gear. Speeds of 1,000 to 4,000 rpm are possible. Optional equipment includes base plates for various mountings, and a "power pack" for converting the engine to special applications.

Full details and descriptive literature on this new engine can be obtained by writing Fox Industries, Inc., 837 State St., Springfield, Mass.



Many accidents on construction result from workers standing up in moving trucks, sitting on the sides, end, or improvised seats. If workers are to be transported by truck, provision for them to ride safely should be made. The National Safety Council has suggested this removable seat for pick-up trucks which can be made easily and economically. The lumber sizes shown are nominal.

"CONTROLLED TRACTION"

...uses entire 13-foot blade...moves more material... farther and faster

ALL WHEELS MISS THE WINDROW...
LOAD IS BALANCED! FRONT DRIVERS PULL AHEAD OF HEEL OF BLADE...REAR DRIVERS PUSH BEHIND TOE OF BLADE...
NEITHER AXLE STRADDLES THE WINDROW...

CONTROLLED TRACTION involves steering the rear wheels, and angling the frame, until the combination of rear wheels pushing behind the toe of the blade, front wheels pulling ahead of the heel of the blade, and blade practically at right angles to the frame in its angled position, *balances the load,* and makes it easy for the "99-M" to move straight ahead with a blade load that would either stall an ordinary Motor Grader, or cause it to slide sideways.

CONTROLLED TRACTION is another reason why no Motor Grader without All-Wheel Drive and All-Wheel Steer can hope to equal the all-around performance of the "99-M"

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

BUILDERS OF ROAD MACHINERY
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SINCE 1859

CUMMER
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EIGHT SIZES
Up to 1000 Tons per day
DRYERS
Two-Fire and Internal Fire
30 to 100 Tons per hour
Electric Batch Timers
50 Years' Experience

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EAST 17th & EUCLID
CLEVELAND 15, OHIO

Air Photos Locate Granular Deposits

Long Costly Field Work Reduced by Identifying Land Forms From the Air; Patterns Are the Key

By ROBERT E. FROST, Research Engineer, Purdue University

✦ ONE of the greatest advantages of aerial photography in highway engineering is its usefulness in locating deposits of granular materials. Good sand and gravel is always at a premium in highway and airport-runway construction, whether as a source of borrow for subgrade improvement, base courses, for concrete aggregate, or for location of runways or highways. The engineer must know the location and extent of such deposits.

The conventional land-reconnaissance method of locating granular materials can be unreliable and wasteful. The deposit land may be inaccessible because of lack of roads or because of dense vegetation. Land owners may not cooperate. Either factor may prevent successful surveying. Even once in the field, it is difficult to trace the areal extent of a deposit. The topographic positions and land forms associated with granular materials are hard to recognize simply because of inability to see vast distances.

Such is not the case when studying a large area with the aid of aerial photographs. The observer is able to view large areas from above, and when a stereoscope is used, the relief of an area can also be studied. The average pattern produced by granular materials is one of the easiest to identify. Once its characteristics are fully understood and interpreted, it is possible to make an air-photo survey of exceedingly large areas in a very short time. The speed with which granular material can be located in that area depends on its geology and physiography. It also depends on the extent of granular deposits, since some areas contain little or no gravel at all. In these cases more detailed study of the area is necessary if the observer is to be absolutely certain he has overlooked no deposits.

Kames, Eskers—Hills, Ridges

Kames and eskers are granular deposits associated with glaciation only. When viewed through a stereoscope these deposits often present the only major relief of an area. They occur as dome-shaped hills (kames) or prominent ridges (eskers). It is believed that they were formed by the deposition of sorted sand and gravel beneath the ice-soil mass; that the deposition resulted from the discharge of melt water through cracks, crevices, or holes in the lower portions of the glacier. In addition to the fact that these deposits must occur in glaciated regions, they have one other identifying feature—a characteristic land form or shape. Either kames or eskers may occur at random in a glaciated area, but their usual occurrence is in clusters or in chains that may extend many miles. The air photo will show this identifying land form. It may also exhibit such identifying characteristics as absence of gullies, light photo soil color, and sharply rounded crests.

Because of their steep slopes and porous nature these deposits contain little or no weathered-soil profile. They have no clay-type gullies and they have no dark tones. They show up in air-photos as broad fan-shaped gentle slopes surrounding the base of the hills and blending into the surrounding topography. Sometimes, however, the pattern of an esker contains flanking channels or depressions which form a line of demarcation between the esker and the surrounding topography.

Because of the sorting action of the running water during the deposition, these deposits are apt to be stratified. Their material size is apt to grade from coarse to fine from the center outward. The importance of this observation lies in the fact that one is sure, when sampling such deposits, to encounter fine sand and silt near the base and for some distance up the slope. This may cause rejection of the deposit. Consequently the sampling should be done near the crest, or at greater horizontal depths into the sides, to obtain a more representative sample of the coarser materials.

Granular Outwash

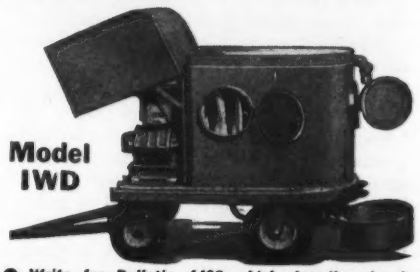
Another important source of material is granular outwash. This sheet of sand and gravel is believed the result of

(*Concluded on next page*)

What YOU SHOULD KNOW ABOUT

MARKLEY-CARTER *Portable* DUST COLLECTORS "*Collects and Controls*"

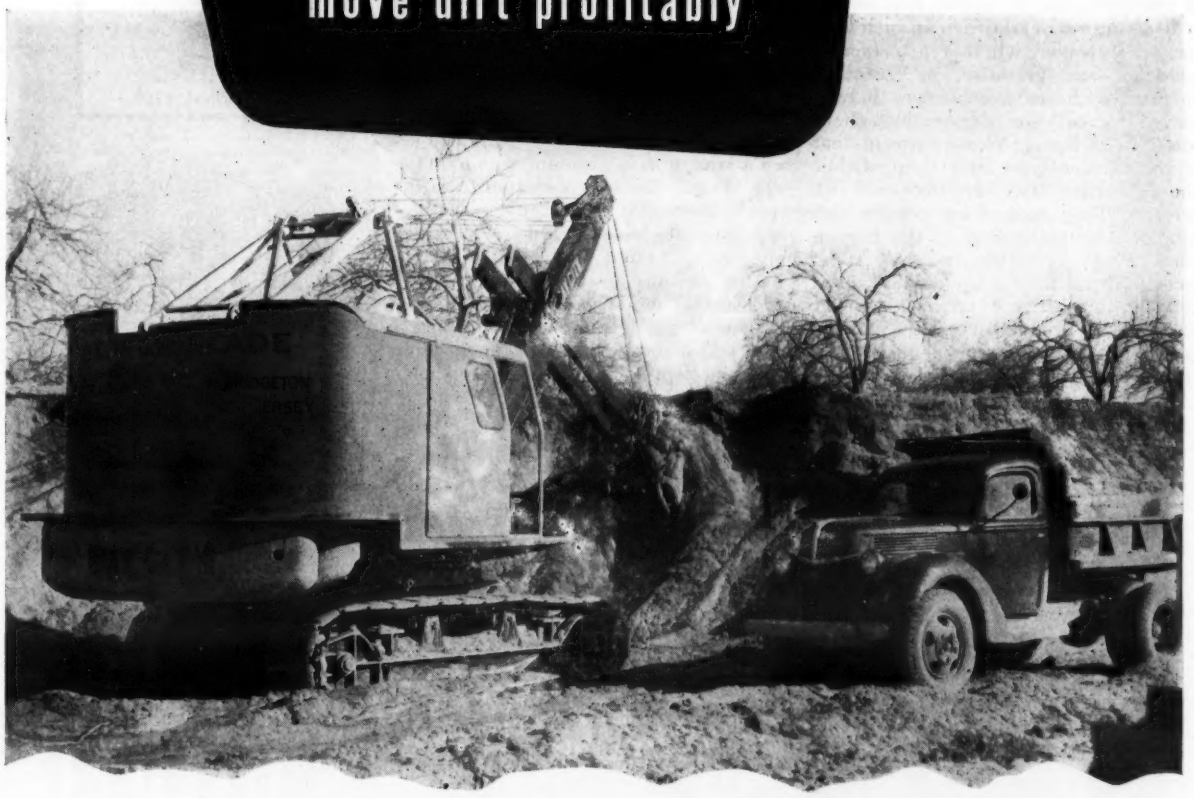
1 Portable units operate through powerful air stream by an effective double separation principle. No dust escapes into the air. Reduces SILICOSIS hazard to safe hygienic limit.
2 When applied to rock drills, SPEEDS UP DRILLING TO 33 PER CENT. Drill steel cuts into fresh rock unimpeded by dust or chips. PROLONGS LIFE OF DRILL STEEL. REDUCES SHARPENING COSTS.
3 Quick detachable hood permits easy inspection of hole and changing drill steel without interference from hood.
4 When applied as industrial unit, collects dust accumulations that are costly and apt to be a hazard both to men and equipment. Keeps your plant, motors and machinery free from harmful dusts.
5 Equipped with Markley-Carter disposal container which permits continuous collection and disposal without closing down the system.



● *Write for Bulletin 4402 which describes in detail the advantages of using* MARKLEY-CARTER DUST COLLECTOR *in your quarry and plant.*

RALPH B. CARTER COMPANY
192 ATLANTIC ST., HACKENSACK, N. J. 53 PARK PL., N. Y. 7, N. Y.

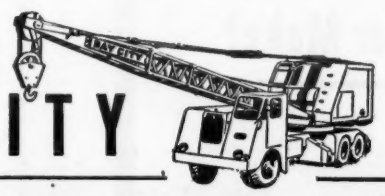
BAY CITY SHOVELS
move dirt profitably



On job after job where dirt is being moved profitably, the heavy-duty construction of BAY CITY is proved with dependable, economical service. From the ⅜ yard convertible shovel up to the "65" shown here, BAY CITY follows the same general pattern—strongly built and rugged throughout to withstand the severe shocks and stresses of tough going. Long, wide crawlers • Alloy cast bases • Tandem drums on separate shafts • Booster clutches • Sturdy, welded shovel boom • Straddle type dipper sticks • One-piece chain crowd • All these advantages add up to greater job performance. Why not get acquainted with the bigger values offered by BAY CITY—Write for catalog or see your nearest BAY CITY dealer. BAY CITY SHOVELS, Inc., Bay City, Michigan.

AMERICA'S FINEST BUILT BY BAY CITY AND USED THROUGHOUT THE WORLD

BAY CITY



SHOVELS • DRAGLINES
CRANES • HOES • CLAMSHELLS

SEE YOUR NEAREST DEALER for Bay City excavating and material handling equipment in sizes from ⅜ to 1¼ yards having crane rating up to 20 tons. Both crawler and pneumatic tire mounting.

Air Photos

(*Continued from preceding page*)

deposition from a large volume of glacial melt water that was able to flow unobstructed and unchannelized for great distances, either entirely beneath the ice or out in front of the ice mass.

The pattern exhibited by this kind of granular deposit has its own set of identifying characteristics. The land form is that of a broad level plain. Its topography may be broken only by old glacial channels or by prominent ridges unassociated with the outwash itself. The porous nature of the soil is indicated by its general light color, and by the absence of a developed surface drainage system. Often there is a general impression of flow. This is created by the presence of current surface scars all going in the same direction. Another important pattern characteristic of this deposit, and of nearly all flat-lying granular deposits, is its ever-present mottled appearance. The mottlings are commonly known as small infiltration basins. The dark spots are slight depressions containing soils of higher clay content.

Interpretation of Terraces

No air-photo pattern of a granular terrace will show all the dominating characteristics. This is due chiefly to variations in the occurrence and depth of the terraces. It is also due to the type of natural overburden on such land forms. However, whether a terrace is granular, non-granular, or granular covered with an overburden, it will always reveal one dominating characteristic in the air-photo pattern: that of the terrace-type land form. Other characteristics may or may not be present. They depend on location and lithologic characteristics of the terrace mass. They are: steep, nearly vertical faces; alluvial fans at the contact zones between upland and terrace; current scars; light photo soil color; mottled grey and light grey color; absence of erosion features; land use related to the soil type as a contrast between upland and terrace and lowland and terrace; and associated vegetative cover as a contrast between terraces and other adjacent land forms.

Engineering Significance

Even though it is possible to locate granular material from the air-photos, it is not possible to tell from them whether or not the granular material will be well suited for concrete aggregate. It is possible only to identify a deposit as being granular and to predict whether it has a high or low percentage of clay. These two factors can be ascertained from air-photo interpretation. But the presence of impurities such as chert and shale particles is strictly a matter of field and laboratory investigation.

It is also relevant to note that glacial outwash areas and broad granular terraces offer excellent possibilities for the location of highways and airfields. Their level topography, well drained soils, and excellent supporting power make them eminently suitable for such construction projects.

From a paper presented at the 32nd Annual Purdue Road School.

Machinery Vibration Stopped by Leveler

Machinery mountings designed to stop the transmission of vibration as well as to provide a means of leveling the machine are made by Bushings, Inc. The units can be used on machines of all sizes, from small bench motors to large drill presses, drop hammers, and the like.

These Vibro-Levelers are usually installed under the machine. Two nuts, one a leveler, the other a lock, are set on a stud, which is mounted in a cylinder. This cylinder is insulated from the outer shell of the unit by a wall of mechanically bonded rubber. This carries the vibration load, and is said to be impervious to the attacks of oil, grease, and similar substances. The entire unit can be bolted to the floor, if desired. Where the level of the machine must be kept as before, ordinary structural brackets may be affixed to the machine in order to attach the Vibro-Leveler.

These units have a safety margin of 16 to 1. They are made in load capacities of 10, 25, 50, 100, 200, 300, 400, 500, 750, 1,000, 1,500, and 2,000 pounds. Though generally used four per machine, any number may be used. The weight of the machine determines the capacity of the Leveler to be selected.

Vibro-Levelers are described in bulletin No. BU-50, available on mention of this notice. Write Bushings Inc., Coolidge at 14 Mile Road, Royal Oak, Mich., for copies.

ELECTRICITY

WHEN YOU WANT IT
WHERE YOU WANT IT

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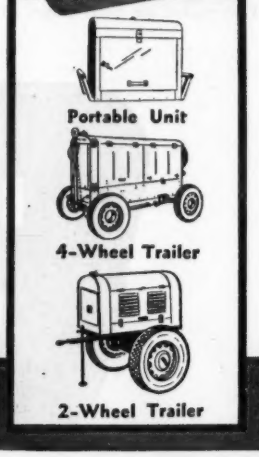

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New Set-Back Levee Built by Three Crews

Embankment 4.8 Miles Long Required 1,780,000 Yards Excavated From River-Side Borrow Pits in Illinois

✦ THE great floods of 1943 and 1944 did more than break through some of the levees along the Mississippi. With equally damaging effect they topped and breached other critical levees bordering on important tributaries. Such was the case in the Preston Drainage and Levee District in Union County, southwestern Illinois, on the east bank of the Mississippi. This district is bounded on the north by Big Muddy River. It flows westward from the high bluffs in the Shawnee National Forest, across the bottom lands to a confluence with the Father of Waters near Aldridge, Ill. During the flood years the main river levee held, but the substandard levee along Big Muddy River failed. Its failure resulted in the flooding of about 52,000 acres of valuable farm land in this leveed area. Under the Emergency Flood Control Act of 1944, the St. Louis District, U. S. Engineer Department, let a contract using Emergency Repair Funds to build a new levee of standard type and grade for approximately 4.8 miles along the south side of Big Muddy River. The levee starts at the bluffs and follows the course of the river for 25,200 feet.

Successful low bidder on this contract was R. B. Potashnick, general contractor from Cape Girardeau, Mo. He started work on the project in October, 1944, but was forced to curtail operations during the unfavorable winter weather and the very wet spring of 1945. As a result, the project will not be completed until midsummer of this year. The contract was divided into two items of earthwork: the eastern section of levee beginning at the bluffs and extending for 14,440 feet, or nearly 2.8 miles, to the tracks of the Illinois Central Railroad at the town of Aldridge; and the western section which continued for the remaining 10,760 feet or 2 miles of embankment. The eastern section required the handling of 1,240,000 yards of material, most of which was a heavy, sticky gumbo; it was bid at the unit price of 29 cents a yard. The western section of levee, built mostly with a sandy loam, contains 540,000 yards and, since it was handled somewhat more easily than the gumbo, went for a bid price of 28 cents a yard. The total contract price for the 1,780,000 cubic yards was $510,800.

R. B. Potashnick, the prime contractor, sublet nearly half of this work to the Regenhardt Construction Co. of Cape Girardeau, Mo. This company is building 7,300 feet, or 1.4 miles, of levee at the upper end, beginning at the high bluffs and extending to a point just beyond the tracks of the Missouri Pacific Railroad which lie to the east of the Illinois Central lines. Although less than one-third of the total length of levee, this subcontract contained 863,715 yards of earthwork, or about 48 per cent of the total.

The remaining 3.4 miles of levee construction was divided by Potashnick into two parts. The section adjoining that of Regenhardt is 7,140 feet, or about 1.4 miles. It is being built under the direction of H. E. McBride, Superintendent, with a complete complement of earth-moving equipment specially suited for the heavy gumbo material. The remaining 10,760 feet, or 2 miles, closest to the river was built under the direction of Superintendent George Shelton with a fleet of equipment more adaptable to the sandy loam.

C. & E. M. Photo
At the southern end of the Potashnick 4.8-mile levee contract, where the material was a sandy loam, LeTourneau Carryall scrapers pulled by Caterpillar tractors, with D7's as pushers, were used.

Levee Section

The old levee, built after the great flood of 1903, was within 50 to 100 feet of the river bank. It was enlarged slightly in 1922 and again in 1928 to an average height of 10 feet with a base width of from 30 to 50 feet. The new levee is known as a land-side set-back,

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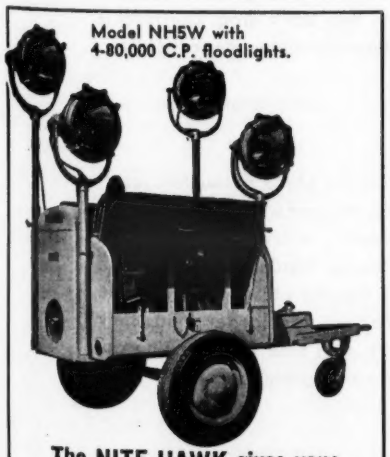

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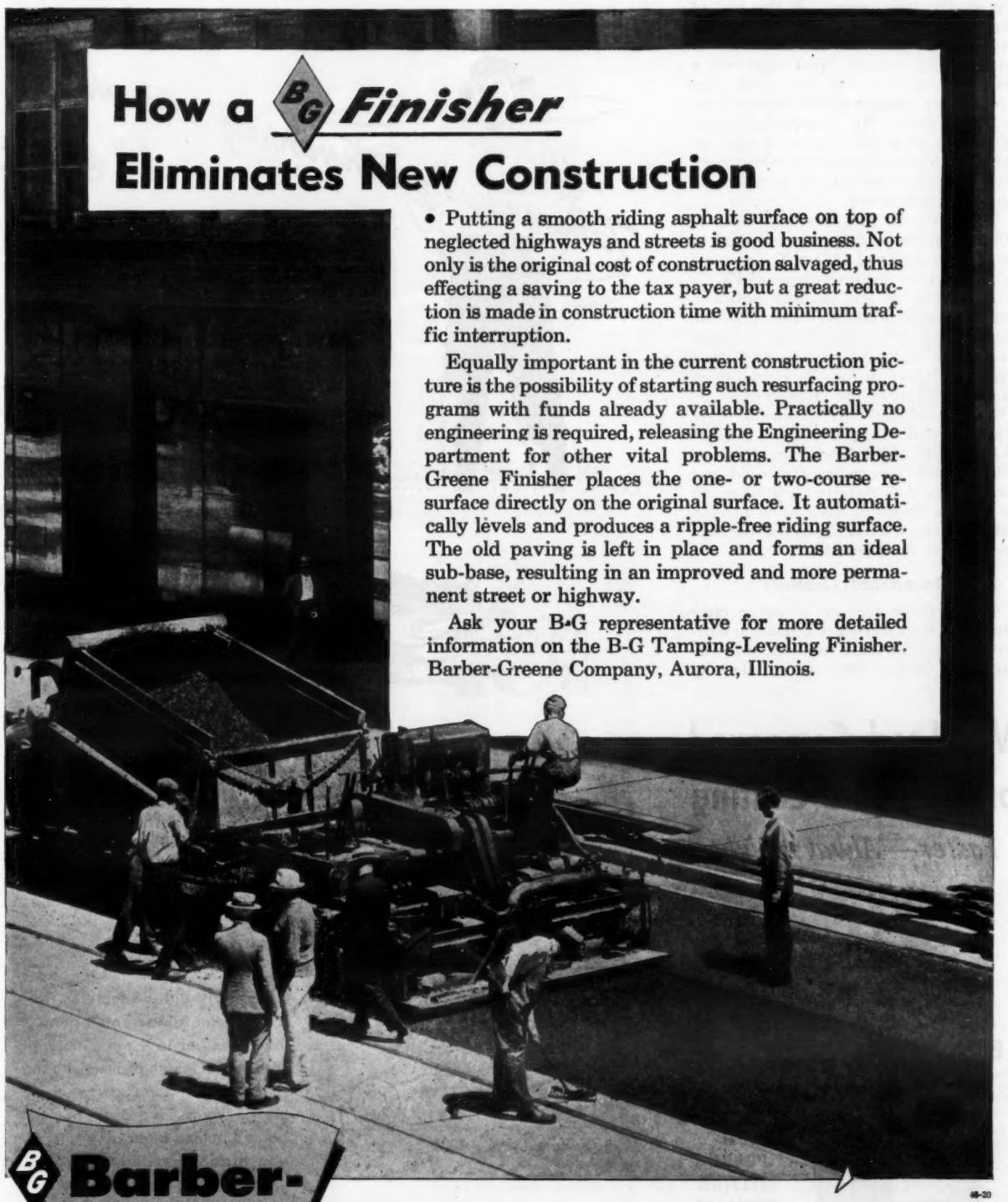

How a B-G Finisher Eliminates New Construction

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LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

New Set-Back Levee Built by Three Crews

(Continued from preceding page)

since it is original construction and not an enlargement of the old. It is built an average distance of 200 feet behind the original embankment. It has an average base width of 150 feet, is 20 feet high, double the height of the old levee, and has a 20-foot crown. On this crown, at some future date, a gravel road will be built. The net grade of the new levee crown is at an average elevation of 370 mean sea level, higher than any point reached in previous floods.

A typical cross section shows 1 on 3 slopes down from the crown on both the river side and land side of the levee. On the land side the embankment slopes down to a point from 6 to 8 feet above the original ground. There a fairly flat berm, with a 1 on 50 slope, extends out for 50 to 100 feet, depending on the topography. At the end of the berm the slope is 1 on 3 down to the original ground. A similar berm extends out on the river side for a standard width of 40 feet, and then drops down to the existing ground with a 1 on 3 slope. An intervening width of 20 feet of original ground was retained before material was taken from river-side borrow pits with which to build the new levee.

These borrow pits were from 200 to 300 feet across and were excavated to an average depth of 15 feet. The amount of excavation required depended to a large extent on the yardage obtained from de-grading the old levee. The side slope of the river-side borrow pit next to the embankment was 1 on 3 to a depth of 7 feet below the elevation of the outer limit of the river-side berm. From the point of such depth, the outward slope of the pit was not steeper than 1 on 25. The rather long distance, 200-foot average, between the old and new levees was required not so much to provide floodway area as to furnish sufficient space from which borrow material could be secured.

Regenhardt Contract

On all three sections of levee construction, the clearing was done in similar ways, with hand methods prevailing. The larger trees were felled by crosscut saws, while the brush was piled up and burned. The Regenhardt contract, which started at the 300-foot-high bluffs, averages nearly 12,000 cubic yards per station, and is being directed by Nelson Berry, Superintendent. All the material at this end was moved with five LeTourneau 15-yard scrapers pulled by Caterpillar D8 tractors. Two Caterpillar tractors, a D7 and a Seventy-Five, acted as pushers in loading the combination of gumbo and sandy silt. The average haul was from 450 to 500 feet, over which the equipment moved at about 5 mph.

C. & E. M. Photo

Equipment on the Potashnick levee contract was fueled by a 900-gallon tank truck. An auxiliary 550-gallon tank on skids was also kept filled and moved about the job as needed. At the right is the Caterpillar lighting plant.

When the weather was favorable, two 8-hour shifts were employed with this equipment—from 5:30 a.m. to 1:30 p.m., and from 1:30 p.m. to 9:30 p.m. In this way the greatest advantage was taken of daylight. When natural light was not available, operations were continued by using two light plants, a Kohler and a Caterpillar, mounted on skid rigs and moved around to any desired location. Each of these plants had four 1,500-watt lights set up on standards about 20 feet high; one was placed in the borrow pit being worked, and the other plant was set up on the fill where the scrapers were dumping. With this equipment Regenhardt averaged 5,000 yards of embankment in a 16-hour day. The fill was placed in layers of 12 inches, and compacted by two LaPlant-Choate sheepsfoot rollers. These were hooked up in tandem and pulled by a Caterpillar D8 tractor, which made at least four passes over the entire surface of a layer. With this procedure the compacted fill had at least 85 per cent of the maximum dry density as determined by the Proc-

(Concluded on next page)

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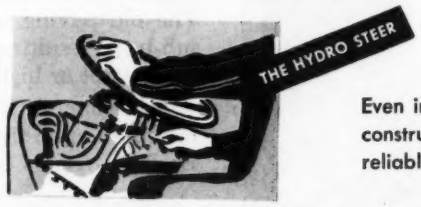
EXCLUSIVE HEIL DEVELOPMENTS



means full hydraulic steering — it is not a booster. Even in heavy going or on rough construction roads, this compact, reliable unit provides passenger-car steering for powerful Heil Hi-Speed Tractors. Such easy handling reduces operator fatigue — it is responsible for faster trips and lower costs.

are the only wagons that have side-opening dump doors. Opened by cable, these doors work on the clam shell principle. They close by gravity and hold the load tightly because of their balance on the trunnions, their interlocking gears, and the cross-locking, shock-plate hooks—the cables are slack. Since these doors swing up out of the way, they can't drag. Dumping is faster and maintenance costs lower.

have many unique features. The bowl design is different. It permits the loading of 15% more material in the same length of time with the same drawbar horse power—there are no voids. The draft point is located behind and above the cutting blade, for better digging. When the blade encounters resistance, the rear wheels tend to raise, producing a leverage action that forces the blade into the ground. The digging ability of Heil Cable Scrapers, the larger loads they carry, and their fast dumping action mean greater profits.

Heil has many new developments to offer. When your time comes to buy new earthmoving equipment, bank on Heil experience and engineering facilities. You will speed up your jobs, have less trouble, and make more money. R-72

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GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

New Set-Back Levee Built by Three Crews

(Continued from preceding page)

tor method.

At least once and sometimes twice a day, a 900-gallon tank truck drove out to the project from Chester, Ill., 40 miles away, to fuel up the equipment. An auxiliary tank mounted on skids, holding 550 gallons, was also kept filled, and was pulled around to where it was needed. Greases and oil were kept on the same skid rigs that housed the electric-light plants.

Potashnick Contract

On the section of the Potashnick contract adjoining that of Regenhardt, excavating was done by a Lima 802 dragline with a 50-foot boom and a Hendrix 2-yard perforated bucket. This equipment was also used to dig an inspection ditch, 7 feet wide x 6 feet deep, at the base of the new levee, with the backfilling done by a Caterpillar D7 tractor-dozer and compacted by a sheepsfoot roller. In building the levee, the dragline loaded six Caterpillar 8-yard DW10 wagons, which made average 750-foot hauls of the heavy black gumbo at a speed of from 10 to 12 mph.

This material was likewise compacted by a LaPlant-Choate sheepsfoot roller pulled by a Caterpillar Thirty-Five tractor. Any additional dressing on the levee was done by a pair of Caterpillar D7 tractor-dozers and a Caterpillar No. 12 power grader. A Caterpillar D8 tractor-dozer worked with this crew, clearing brush. The equipment was serviced by a greasing unit which was mounted on a pipe skid and consisted of a Lincoln grease gun with a Curtis air compressor. An average of 2,000 yards of material was moved in an 8-hour day.

On the section closest to the river, the sand material was on top, with the clay and gumbo far below. So scrapers were chosen as best suited for moving this type of material over an average haul of 500 feet. Equipment included four LeTourneau FP 15-yard scrapers pulled by Caterpillar D8 tractors, and one LeTourneau 12-yard scraper pulled by a Caterpillar D7. Two other D7's served as pushers in the loading, while a similar tractor pulled a LaPlant-Choate sheepsfoot roller over the fill for compaction. This crew also averaged 2,000 yards in an 8-hour shift.

Whenever sufficient labor was obtained, two shifts were worked on these two lower sections, as they were on the upper subcontract. A Kohler 5-kw light plant with three 1,000-watt lights, mounted on a skid rig, was set up in the borrow pit. A larger plant, a Caterpillar 15-kw unit, with six 1,000 to 1,500-watt lights, illuminated the fill. When working two shifts, greasing of equipment was done under lights after the close of the second shift. Alemite air guns, housed in a small shack set up near the scene of operations, were used for lubricating. Field repairs were done with a Lincoln 200-amp portable electric welder.

Personnel

Because of the remote location of this construction and its distance from any fair-sized centers of population, great difficulty was experienced in transporting workers to the job. In some cases the contractor had to send trucks as far as 25 miles to pick up men to work on the levee. The total number employed varied between 50 and 100, depending on whether one or two shifts were being worked. Transporting equipment was a much simpler affair. Tractors, scrapers, and even the dragline were put on barges and floated to the site on the Mississippi, so that they were ready for work as soon as they were unloaded.

The construction repair of the Big Muddy River levee in the Preston Levee Drainage District is under the direction of the St. Louis District, U. S. Engineer Department, of which Col. L. B. Feagin is District Engineer, Lt. Col. J. A. Adams is Deputy District Engineer, Lt. Col. E. H. Shutt is Executive Officer, and Lt. Col. W. F. Lawlor, Chief of the Engineering Division. Capt. L. F. Trost is Engineer in charge of flood control, with C. H. Weaver as his assistant. L. E. Dillow is Assistant Engineer on the earthwork and drainage section. Harold C. Shaver is Chief Inspector for the U. S. Engineers. H. E. McBride and George Shelton are Superintendents for R. B. Potashnick, and Nelson Berry, Superintendent for the Regenhardt Construction Co.

The year 1946 will see great activity in flood-control work in the St. Louis District. O'Dell & Riney Construction Co. of Kirkwood, Mo., will build about 3,000 feet of levee tying in the end of the Big Muddy River levee with the main levee along the Mississippi. During the next four years about $25,000,000 will be spent in reconstructing substandard levees that failed in the flood years of 1943 and 1944. Almost half of that amount, or $12,000,000, will be spent during 1946.

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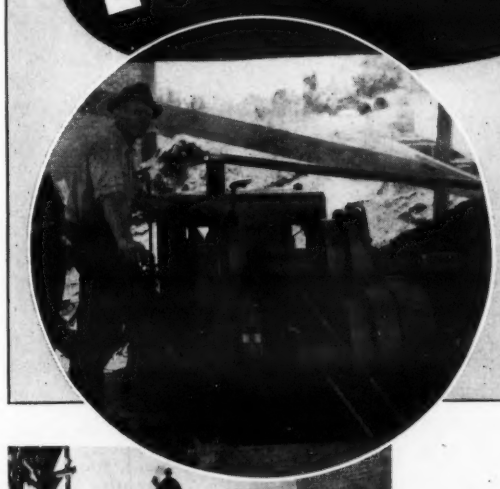

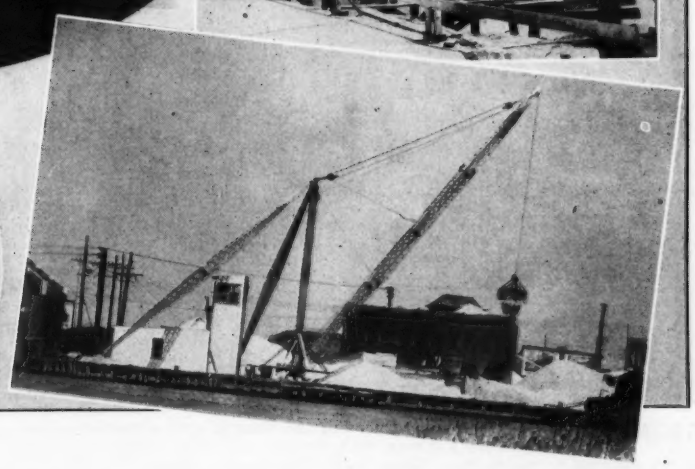

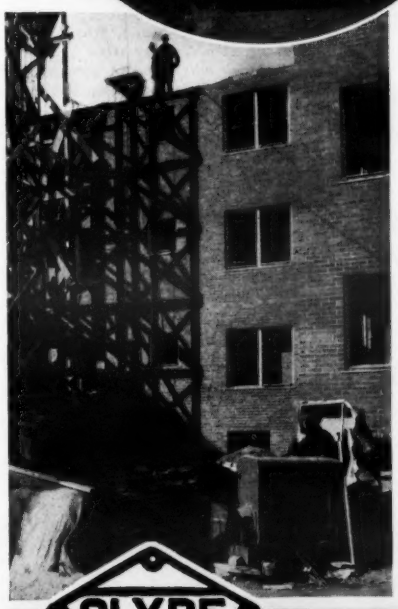

Clyde hoists are manufactured in an unusually wide range of sizes and styles to provide the right machine for any kind of construction or material handling work.

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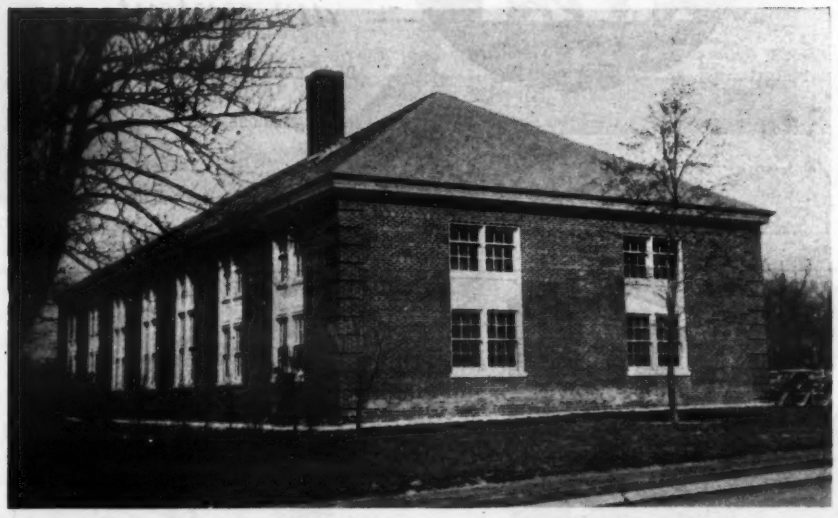
(*See article on page* 1)

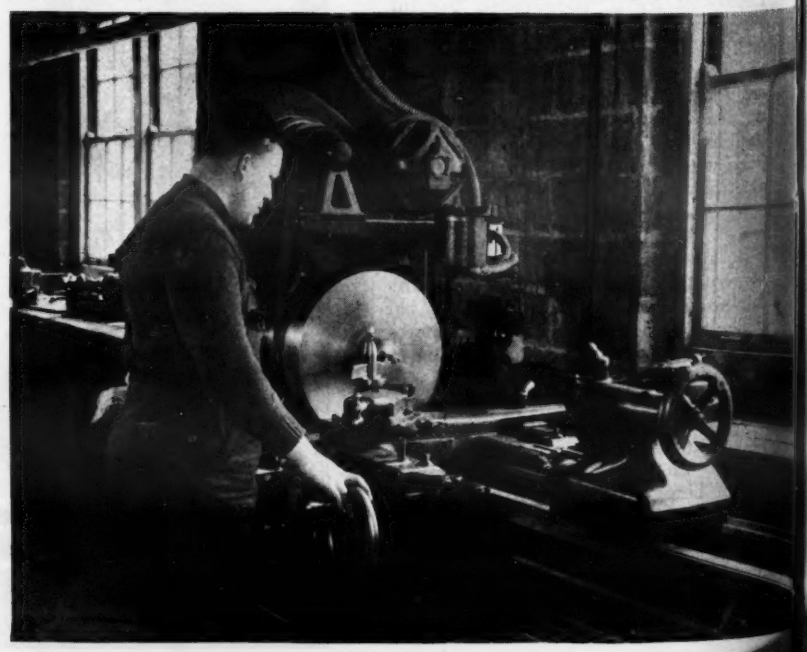


DISTRICT HQ. Red brick buildings forming three sides of a quadrangle around a central yard present a pleasing appearance and house the facilities for the care and repair of 124 pieces of motor-driven equipment used in District 10 of the New York State Department of Public Works. Grounds around the buildings in Babylon, L. I., are covered with grass and landscaped.

SIGN SHOP. On the second floor of the shop is a 28 x 24-foot room where a 3-man staff repairs, paints, or makes wooden signs, and repairs metal ones. When the C. & E. Monthly camera visited the shop, a weather vane in the shape of Long Island was being painted.

STOCK ROOM. Half of the second floor is given over to the stock room where bins and cabinets keep parts and supplies in order. A decimal numbering system is used for identification.

MACHINE SHOP. Occupying an area 48 x 15 feet, the machine shop contains a variety of units for equipment repair. At the left the operator of a South Bend 18-inch x 10-foot lathe makes a drift to knock out bushings on a water pump. Raised letters are being cut from a highway direction sign on a Kemp Smith No. 2 milling machine in the center, while at the right the operator of a Canedy-Otto 27-inch drill press drills holes in a piece of angle iron to go on route markers. Receptacles for waste and rubbish, located at convenient points throughout the shop, keep the floors clear of trash. Below, a close-up of the lathe.



OFFICE. In the office of Shop Superintendent Jack Herzy are the equipment files. A folder for each piece of equipment serviced by the shop contains a complete history of the unit, with detailed records of repairs and replacements. Equally detailed tire records are maintained. A well stocked first-aid kit is readily accessible on the files.

GARAGE. The types of machines looked after in the District 10 garage and shop are varied. A Wright 3-ton chain hoist lifts a heavy engine, while a truck, passenger car, and mower are lined up for attention.

LUBRICATION. This vital part of equipment care receives ample attention in the District 10 shop as a U. S. grease gun lubricates a spring shackle on a Brockway 3-ton truck.

FENDERS of a state-owned car undergo repairs. A No. 9 sanding disk in a Sioux portable flexible-shaft grinder and buffer does the job. In addition to highway equipment, all passenger cars of state departments with offices in New York City are taken care of in the District 10 shop and garage.

BENCH WORK. Well lighted work benches carry, among other equipment, a Kwik-Way valve-facing machine, on the left. The man at the right is using a Sunnen hone to make a wrist-pin hole in a piston.

ENGINE CARE Engines are regularly overhauled and repaired. Here cylinder sleeves are inserted in a Ford engine on the motor block. A swivel clamp on the block permits the engine to be turned in any direction.

WELDING. A small room off the south side of the garage houses the welding and blacksmith shop. Arc welding is done with a General Electric 375-ampere unit.

Traffic Boom Doubles Road-Maintenance Job

Good Organization Plus Hard Work Needed to Solve Problem of Keeping Roads in Condition

✦ MANY a road builder's monument turns out to be a maintenance man's grave. The broad highways of the nation, becoming wider as engineers demand more right-of-way, are the problem of the maintenance engineer as soon as construction crews leave. In southern California, that fabulous land where everything is bigger and better, they will tell you with a twisted smile down at District VII state highway headquarters that road maintenance is no exception to the rule.

There is a reason for this, of course. Southern California is attracting a tremendous influx of new residents. Motor-vehicle registration has soared since the war. In Los Angeles, Orange, and Ventura Counties, which are included in District VII, the automobiles are literally bumper to bumper.

Not only in the city of Los Angeles, but all over the county the situation is the same. Heavy trucking, passenger traffic, and pleasure cars use every available road. It is the fastest-growing community in the United States. Los Angeles now ranks fourth in national population and resembles nothing so much as the Oklahoma land rush of 1890.

District VII, with headquarters in the State Building in Los Angeles, is headed by S. V. Cortelyou, District Engineer. The maintenance of state highways and bridges is under his jurisdiction, along with new construction of state highways. The maintenance department is headed by Maintenance Engineer W. L. Fahey.

The state highway system within this district consists of 1,484 miles of roads, 461 miles of which are within the limits of cities. Whether or not this means anything is a moot point, for many of the roads which District VII classes as "rural" have traffic counts in excess of 10,000 vehicles per day. These roads are especially busy on week ends, when traffic flows at 40 miles per hour with scarcely any daylight between automobiles. If you think this is an exaggeration, the traffic fatality count is now somewhere over three persons a day. They do everything in bigger and better fashion in southern California.

District VII is flanked towards the east and north by mountain ranges 5,000 feet high, with occasional 10,000-foot peaks. The land from the base of the mountains is sloping or level, and stretches for miles towards the blue Pacific. It is filled with teeming cities and urban districts.

Floodwaters a Problem

The control of floodwater is one of the big district maintenance problems. The streams which drain this land are short, with a steep hydraulic gradient. As an extreme example, San Antonio Creek falls 10,000 feet in a distance of 40 miles. Run-off water from winter rain and snow follows natural watersheds channels; or at least it did before the land grew up and became filled with houses. Now the tendency among landowners is to block natural watersheds and train run-off water down streets and roads. The results are disastrous.

The situation has been complicated, too, by other public agencies sometimes allowing residents to get away with this destructive practice. Rural roads have ditches; state highways have improved shoulders and generally flatter side slopes with shallower drainage ditches. Where residents have blocked up a natural watercourse to shunt water down a state highway, action is constantly necessary on the part of a traveling patrol to have such impedimenta removed.

Many are the human-relations problems in this fight for water control. Recently a landowner down in Orange County frantically called the State Division of Highways.

"The rain water is coming across the state highway and ruining my land," he complained. "Please send somebody out here right away."

One of the men from District VII headquarters went out there. Sure enough, water was pouring in a torrent across the state highway onto the owner's lot. But the state man took the landowner in his car and pointed out why. Up above his land a county road ran at right angles to the state highway. Landowners along the county road had sandbagged along their property lines, thus diverting the rain run-off from its natural course and training it onto the county road. Naturally the water ran on down to the state highway, jumped the pavement, and flooded the man's land.

The state engineer argued persuasively that the state couldn't be held responsible for this man-helped situation. He climaxed his argument with

(Continued on next page)

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***the Easy Way* with**
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MOUNTED ON SWIVEL BASE

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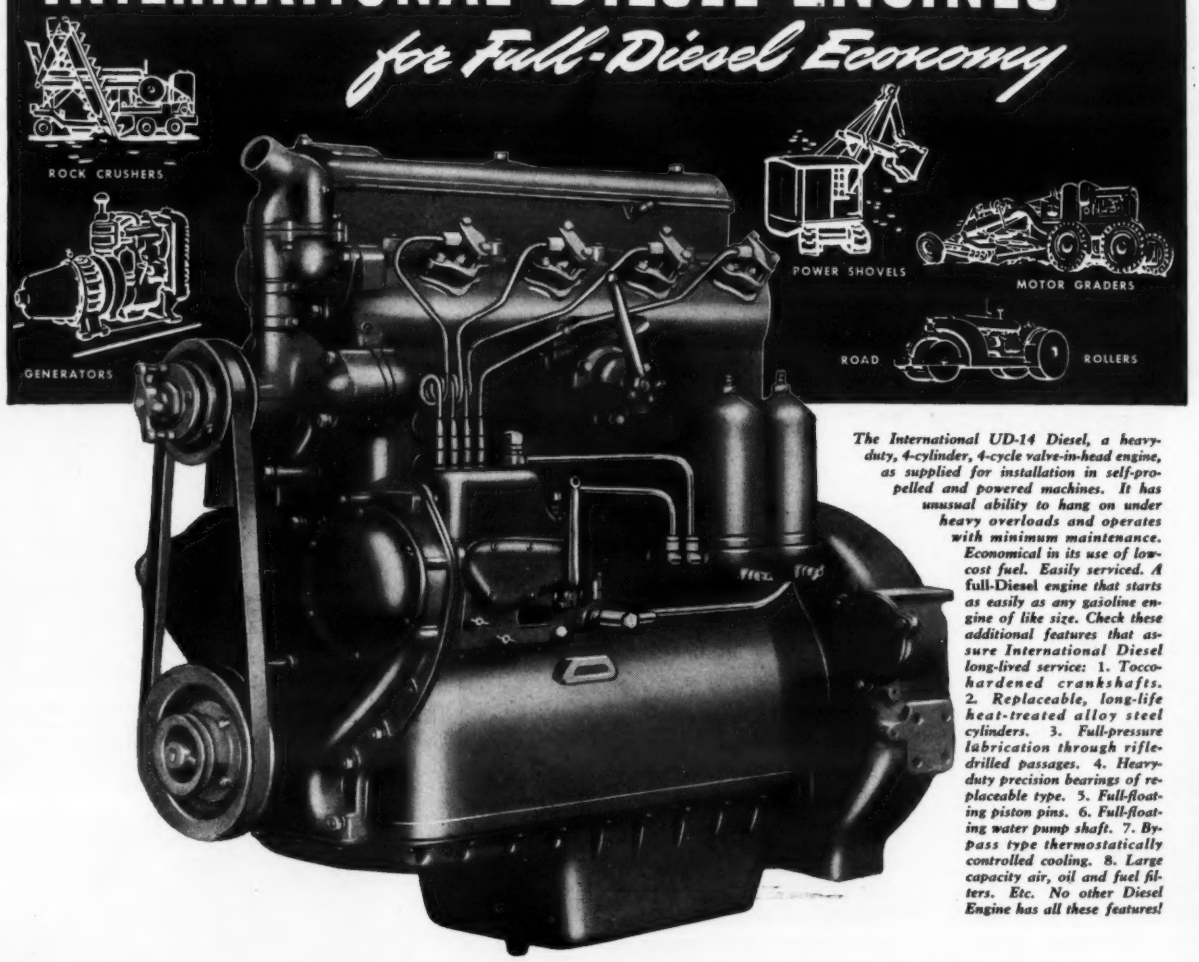

The International UD-14 Diesel, a heavy-duty, 4-cylinder, 4-cycle valve-in-head engine, as supplied for installation in self-propelled and powered machines. It has unusual ability to hang on under heavy overloads and operates with minimum maintenance. Economical in its use of low-cost fuel. Easily serviced. A full-Diesel engine that starts as easily as any gasoline engine of like size. Check these additional features that assure International Diesel long-lived service: 1. Tocco-hardened crankshafts. 2. Replaceable, long-life heat-treated alloy steel cylinders. 3. Full-pressure lubrication through rifle-drilled passages. 4. Heavy-duty precision bearings of replaceable type. 5. Full-floating piston pins. 6. Full-floating water pump shaft. 7. By-pass type thermostatically controlled cooling. 8. Large capacity air, oil and fuel filters. Etc. No other Diesel Engine has all these features!

If it's powered by an International Diesel Engine you have assurance of *full-Diesel* performance and matchless operating economy in the powered equipment you buy. With it you get more work done per dollar of cost for fuel and maintenance.

Internationals are smooth-running, 4-cycle, *full-Diesel* engines. Advanced design fuel injection and combustion assure full use of the fuel consumed. And International's positive, instant starting system makes any International Diesel as easy to put to work as a gasoline engine of like size and horsepower. That means no wasted time, no hesitation when you want power on the job.

Therefore, any powered equipment is better equipment if it is powered by a dependable International Diesel Engine! Visit distributors who handle International Powered Equipment for further facts and help in selecting the equipment you need. There's an International Industrial Power Distributor near you.

Industrial Power Division
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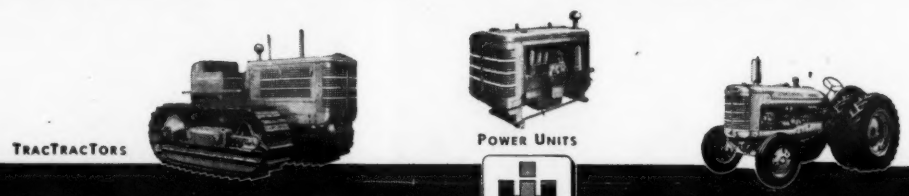

INTERNATIONAL Industrial Power

Traffic Boom Doubles Road-Maintenance Job

(*Continued from preceding page*)

an afterthought about the rain, "After all, you know these things are an act of God."

"Yeah, you guys are all the same," replied the landowner. "Why do you have to blame it on somebody who ain't here to defend himself?"

The State Division of Highways copes with this water situation by maintaining a patrol to see that natural watercourses are left open. Unless the situation is nipped in the bud, it becomes malignant. There have actually been instances where watercourses have been illegally blocked, and have remained unnoticed for such a long period of time that legal action in the California courts has not been successful in getting the obstruction removed.

For bank protection, 30-foot rail cribs, filled with one-man stone, have been built along stream banks. District V has developed a portable tractor-mounted pile-driving rig for this work, and since the maintenance developments of the different districts in California are pooled, it seems likely that such a rig will be adopted in District VII. An Allis-Chalmers HD-10 is used to mount this pile-driving apparatus. A 17-foot boom is bolted to the drawbar back of the tractor. Two cables are fastened from the top of the boom to the dozer arm on either side of the tractor, and the boom is raised or lowered by raising or lowering the dozer blade. The hammer guides are of 4 x 6-inch x 16-foot timbers fastened to 3 x 12-inch x 16-foot stiffeners. The lower ends of the leads are strut-braced to the tractor drawbar. A 500-pound drop hammer is operated by means of the tractor power-control unit.

Maintenance Organization

The district maintenance organization under Mr. Fahey consists of 5 maintenance superintendents, located in San Fernando, Santa Ana, Whittier, Ventura, and Santa Monica. Each maintenance superintendent has his own office with a timekeeper and stenographer.

Under each superintendent work 5 maintenance foremen, each of whom has an average of 3 equipment operators and 3 laborers. These men work out of one of 23 maintenance stations or 3 substations in the district. They report to that station for work in the morning and check back in at night. Each of these foremen is responsible for 23 to 90 miles of road maintenance.

In addition, the District keeps a road-striping crew busy, 3 bridge crews, and 2 tree-trimming crews of 4 men each. These men operate under the supervision of the maintenance superintendent in whose district their work takes them.

The maintenance department of District VII does not own a single piece of equipment. It rents what equipment it needs from the Equipment Department of the State Division of Highways, which has a central shop and garage located in North Hollywood. The number of machines assigned to the different maintenance stations is more or less constant, of course, but when unusual flood, slide, or snow conditions occur, the equipment is shuffled to meet the situation. Additional equipment is often rented from outside sources.

Funds for Road Work

All state highway funds in California come from a state tax of 3 cents per gallon on gasoline sales, from a tax on diesel fuel, and from the motor-vehicle-registration fees collected in the sale of license plates. The Division of Highways overhead, state highway patrol, and all construction and maintenance work is paid for with this money.

Under state law, the 3-cent gasoline tax is divided as follows: not in excess of 1 cent for administration and maintenance of existing state highways; 1 cent to counties for the maintenance and construction of county roads; ½ cent for new state highway construction; ¼ cent for state highways through cities; and ¼ cent for major streets within city limits. Thus, in the apportioning of highway funds, District VII deals not only with state but with city problems as well.

Under existing arrangements, funds allotted to cities for the upkeep of state highways within their boundaries very often come down to district headquarters in the form of work orders for definite jobs. Trained personnel and state highway department machines do these city jobs more economically than the smaller cities can build up their own organizations. Quite a few of the cities in the three counties use state maintenance in this manner.

(*Continued on next page*)

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22,000 HOURS OF OPERATION---

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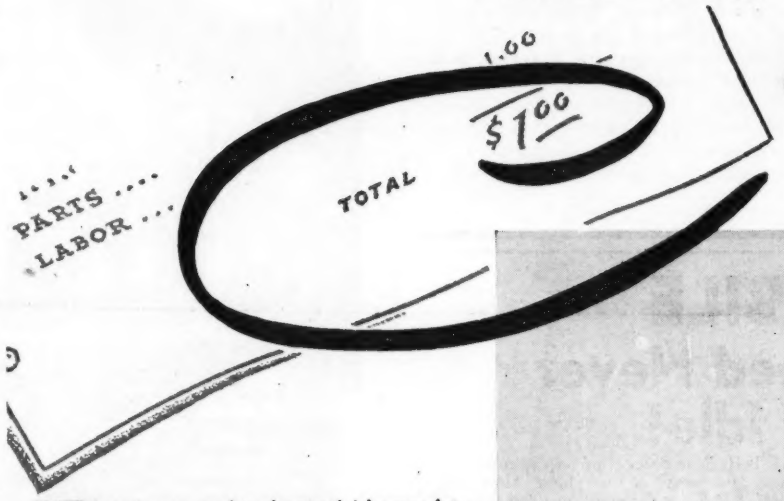

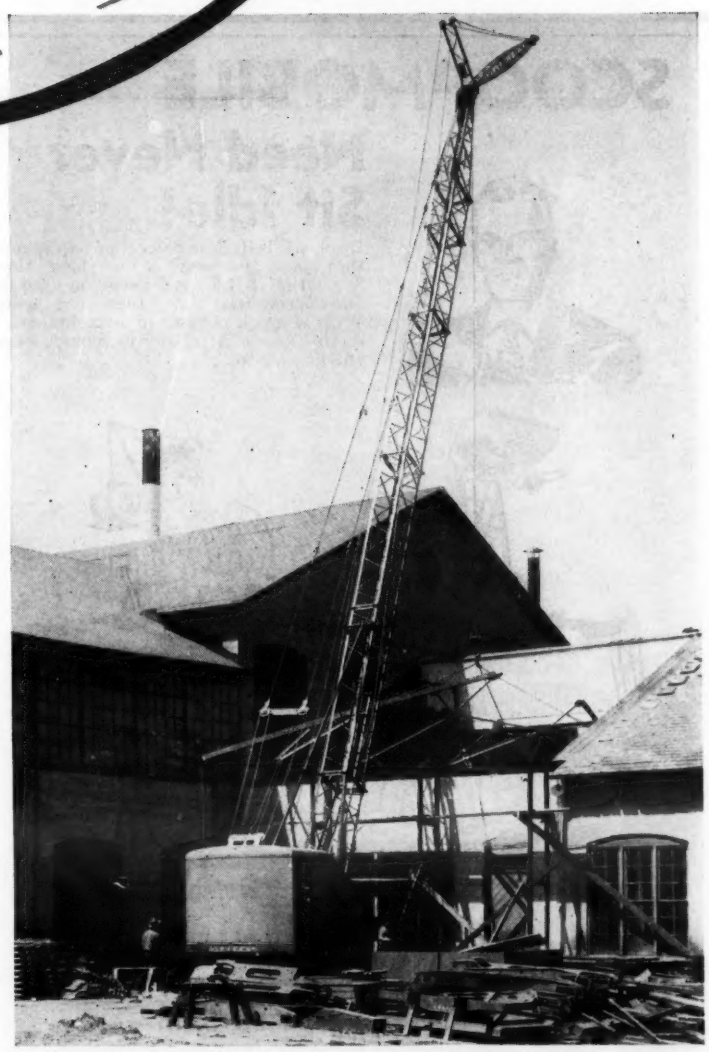

There's a record to shoot at! A heavy duty ¾-yard GENERAL, owned by Mr. J. R. Savage, prominent Ohio construction man, operated an average of 20 hours a day for 3½ years, working alternately as pull shovel, clamshell, dragline and crane, and during that time the total cost of repairs to the unit was exactly ONE DOLLAR! That's keeping service costs at rock bottom!

And don't forget, this amazing record was compiled on all types of work . . . Mr. Savage keeps his equipment busy on every kind of job. This GENERAL took all the jobs, even the toughest ones, in stride. Right now, this unit is busy on a $750,000 project Mr. Savage has started for the Wheeling Steel Corporation.

Low-cost, efficient performance like this means lower bids, more work, greater profit. The record proves that General-built equipment will deliver cost-cutting performance, time and again. Remember, 98% OF ALL THE GENERALS EVER BUILT ARE STILL IN ACTIVE SERVICE. That's a factor worth considering when you're planning to purchase new equipment. Better get complete details on the new line of GENERALS soon to be available . . . it's the first step to greater profits!

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GENERAL
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

Traffic Boom Doubles Road-Maintenance Job

(*Continued from preceding page*)

Maintenance of Highway Surfaces

The highways of District VII are classified as follows:

Type	Miles
Portland-cement concrete	301
Asphaltic concrete	166
Bituminous macadam	53
Hot plant-mix	202
Road-mixed gravel	201
Plant-mix over concrete slab	30
Oiled earth	38
Graded earth	4
Plant-mix over asphaltic concrete	12
Bituminous macadam over concrete	8
Bridges	8
City streets (various types)	461
Total	1,484

Since the road surface is predominantly black-top, the main headache from the viewpoint of the maintenance man is how to keep the riding quality good by sound patching. All maintenance men are familiar with the practice of controlling bitumen to within a fraction of 1 per cent on new construction, but of tossing all this control overboard when patching. California's District VII has solved this situation very neatly by stockpiling patching material, which has been batched through a mixing plant with the same degree of accuracy as the pavement for new construction.

Known as SC-4 pre-mix stockpiled material, it is mixed at a central plant at a temperature which averages 225 degrees F. The SC-4 bitumen goes in this mix accurately at the approximate rate of 5 per cent by weight. Screen gradations of mineral filler are as follows:

Sieve Size	Per Cent Passing (Allowable)
½ inch	95-100
No. 4	65- 85
No. 8	47- 65
No. 30	25- 39
No. 200	5- 12

Dump trucks stockpile the material while it is hot. Trucks are dumped load against load in the form of a big loaf, with the help of one laborer with a shovel. The material scabs over to a depth of perhaps 1 inch, but the inside remains exactly as it came from the plant. Maintenance trucks then dig a slice off the pile as it is needed on the roads, and the material stays alive for about 3 years. A good practical test of its vitality is this: if it crawls as if it's full of worms, when you dig it out of the stockpile, it's still good.

This patch-mix costs about $2.00 per ton f.o.b. mixing plant, and runs about $4.50 a ton stockpiled. It costs about $6.50 a ton in place, depending on the length of haul from stockpile to highway. It has worked so successfully all during the war that the old road-oil men of the maintenance department have about all thrown in the sponge in favor of this new method. Very rarely, on California highways in District VII, does one see the familiar slick, oily patch which invariably marks the over-application of bitumen.

Throughout District VII, subgrades are generally bad in the flat coastal area which is heavily traveled, and generally excellent in the desert and mountain sections. This fact accounts for the apparent disparity in mileage allocation between the different maintenance foremen. The fact is that a man with little mileage in a heavily traveled section has just as much maintenance work as the foreman who services many miles in mountainous sections. The latter are seldom heavily traveled unless it snows.

Snow Removal

This also sounds unbelievable. Snow in southern California? Crowded traffic on snowy highways? Once again, southern California is southern California!

From 4 to 7 feet of snow normally falls each winter on Ridge Route 99, between Los Angeles and Bakersfield. Up to 13 feet falls through the Angeles Crest section. When snow falls on the Ridge Route the big trucks, which haul nearly 75 per cent of Los Angeles' food from the north, never stop. State snow-removal forces have to keep this section open. And when snow starts falling in the Angeles Crest section, ski enthusiasts, without chains but with plenty of enthusiasm, start up the mountain roads before the big Snogo plow at the Chilao Maintenance Station can get rolling. The automobiles pile up as far back as Red Box, and by and by the highway is a milling, bawling, horn-blaring jumble of confusion, with the snow plow trying to clear the road, cars getting stuck, highway patrolmen tearing their hair, and the ski enthusiasts growing more apoplectic by the minute.

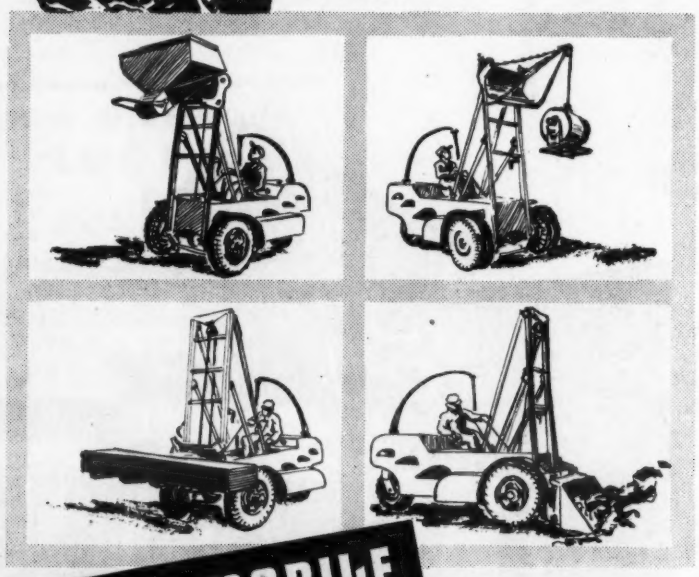
Nowadays the snow-removal problem is fairly well controlled by the use of radio. At the Ridge Route Maintenance Station, 3 miles above Pyramid Rock, the State maintains a radio station which operates on the same frequency as the California State Highway Patrol. Superintendent Gallagher at Maricopa, Harbey at Saugus, and District Maintenance Engineer Fahey have two-way radio sets in their cars. All snow-removal equipment has a receiving set. Nearly all the employees have barometers, and, what is more important, they watch them. Up-to-the-minute weather reports are secured from the U. S. Weather Bureau at Burbank.

The light truck-mounted blades go into action when snow starts falling, on

(*Concluded on next page*)

SCOOPMOBILE Need Never Sit Idle!

Here at last is a piece of equipment that pays its way in a short time. SCOOPMOBILE need never be used for one specialized job, then put aside. With a quick change of attachments it scoops, hauls, lifts, dumps, pours, loads, stacks, spreads.



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SCOOPMOBILE economically handles most any type materials . . . dirt, cement, coal, rock, lumber, and many others. Write Dept. "CE" for complete details and information.

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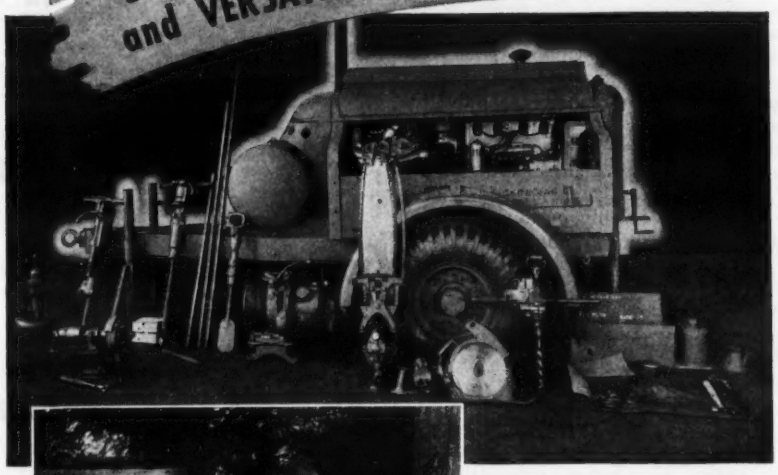
AIR TOOLS for MOBILITY and VERSATILITY on all fronts...



Air tool used by Royal Canadian Engineers — a Waukesha Engine powered Canadian Ingersoll-Rand Portable Air Compressor, complete with auxiliary equipment including a chain saw for felling trees, power hand saw for heavy timber construction, air operated auger, grinding stand and sump pump.

Making repairs at battle front — Royal Canadian Engineers using an air hoist, mounted on a tree trunk, to pull a drag scraper. *Overseas Photo Courtesy of Dept. of National Defense (Canada)*

Compressed air was "ammunition" for the front-line Royal Canadian Engineers who repaired damaged bridges and constructed new ones, built roads, landing fields and advanced bases. *Waukesha-powered* Canadian Ingersoll-Rand Portable Air Compressors give their pneumatic tools the mobility and versatility so vital to battle-winning efficiency . . .

This Waukesha-powered equipment is now ready for peacetime work . . . building bridges and highways, tamping ties, municipal street maintenance, and all construction contractors' projects.

The Waukesha Engine and the compressor are joined in a single unified assembly—for complete reliability. All the advantages of multi-cylinder power—quicker acceleration, clean combustion, cool valves and fuel economy with more power—are built into this compact, sturdy, 4-cylinder Waukesha Engine.

Waukesha Engines . . . gas, gasoline, or diesel fuel. . . . for shovels, cranes, hoists, pavers, mixers, graders, surfacers, tractors or any peacetime industrial power machinery are available *now!* Consult Waukesha about all your engine needs.

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WAUKESHA ENGINES

Traffic Boom Doubles Road-Maintenance Job

(*Continued from preceding page*)

the theory that a little snow is easier to move than a lot of snow. When they have a good windrow thrown on the shoulder, the big push-plows then move it farther over out of the way, to make room for more snow from the light plows. Sand is kept stockpiled so that icy hills can be sanded fast. Equipment is shuffled around at such times, by radio orders, to control any crisis as it develops. Any crisis, that is, except one: those skiers. Nobody has ever found a way to control them by radio, or, for that matter, by any other method except shooting, and that is of course impractical.

As a rule, the Ridge Route has priority on snow removal because its traffic is vital to a city's life.

Other Maintenance Problems

Down along the Pacific Ocean at Malibu, where a state highway was cut at the base of high mountains, heavy slides during the rainy season are common. The control of slides is a maintenance job, and is ordinarily handled by dump trucks and one or more 1½-cubic-yard Northwest shovels from the North Hollywood shop.

Another odd problem is the encroachment of advertising signs on state highway right-of-ways. In their zeal to place each new outdoor sign in front of the existing ones, advertisers frequently intrude their signs upon state highway property. They are then a menace, they obstruct vision, and they slow down mowing machines. At such times a man from Mr. Fahey's department casually calls the offender, and suggests that the sign be moved back or taken down at once.

With traffic growing by leaps and bounds, road maintenance is an ever-growing problem. Only by becoming constantly more adept at their routine work have the maintenance men been able to cope with this fast-developing situation. The gross annual budget for maintenance is now something like $1,100,000, and is growing.

It is now rumored on good authority that the traffic menace will be solved by new construction of still more highways, expressways, and urban roads. But this can only complicate matters for the maintenance men. In turn, they will have to expand with the added construction, intensify their efforts, invent more short cuts, or simply work harder.

Personnel

In addition to Engineers Cortelyou and Fahey, who have previously been mentioned, C. H. Purcell is Director of Public Works for the state of California, with headquarters at Sacramento. George T. McCoy is State Highway Engineer, and T. H. Dennis, Maintenance Engineer.

Saw Cuts Concrete, Masonry, Metal, Etc.

Many types of masonry, concrete, tile, sewer pipe, and even metals can be cut with the Clipper masonry saws made by the Clipper Mfg. Co., 4017 Manchester, St. Louis 10, Mo. The tools operate on a different principle than the normal wood-cutting saw and are designed specially for cutting masonry materials.

Actuated by an electric motor, a blade mounted in a streamlined housing on a special metal frame cuts into the material which is moved back and forth beneath the cutting arc. The material being cut travels on a ball-bearing conveyor cart. Because of the "multiple-cutting principle" of Clipper saws, the blade cuts along a short arc, and must travel back and forth through the material a number of times. This makes for speed, long blade life, and less usage of power, Clipper explains. A foot pedal controls the saw in cutting. Special clamps are available to hold pipe or other materials for unusual or intricate cuts.

Clipper has issued a 32-page "Index" of practical cutting information, which gives the background of masonry saws, their development, and many hints as to their use with various materials. Copies of the index and other literature describing these saws can be obtained by writing the firm and mentioning this notice.

Gravel-Washing Equipment

Equipment for washing and classifying sand, gravel, and ore is presented in a new catalog issued by Eagle Iron Works. Typical installations of such equipment are shown, and specifications included. The 28-page booklet covers log washers and screw washers, fine-material washers, dehydrators and classifiers, shale removers, sand tanks, and special equipment.

Aggregate-plant operators can secure copies of this catalog, No. 46, by writing the Eagle Iron Works, 129 Holcomb Ave., Des Moines, Iowa.

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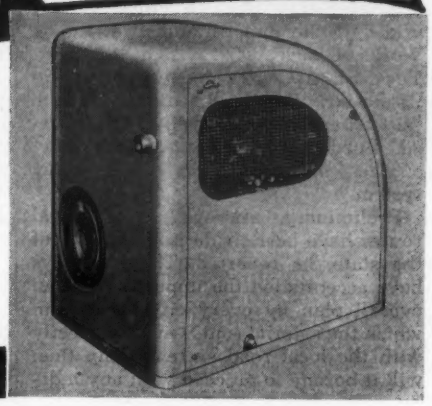

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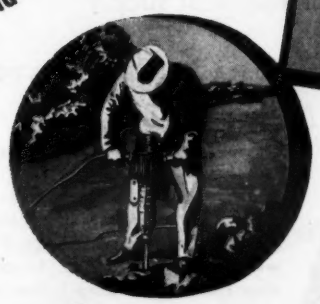


BREAKING

TAMPING

BARCO Portable Gasoline HAMMERS

N. Y. State and Cities Plan Arterial Routes

It is "one of the most progressive steps ever taken in the cause of highway development in New York State." This was said of the legislation that has resulted from Governor Dewey's recommendation that state funds be used to provide adequate highway facilities on arterial routes through cities. It was said by State Superintendent of Public Works, Charles H. Sells, at the New York State Conference of Mayors in Rochester. "For the first time," he said, "cities have been relieved of the financial burden of providing for the relief of these bottlenecks in our highway system."

Preliminary surveys for arterial routes have been made in every city of the state, he reported. These surveys have accentuated the importance of an overall plan by every city—a plan in which the arterial routes mesh perfectly with the local road system. Only then will it be safe to proceed with any individual project, Mr. Sells explained.

State-built city arterial routes are now being planned for Buffalo and Rochester. Others are under consideration. Fund allocations, to be made over a 5-year period, are based on relative populations. Two or three years' allocations will be assembled all at once so the project can be completed in one operation. Federal-Aid highway funds will also be used in the work.

Surveys of traffic origins and destinations are to be made in each community, Mr. Sells said. He expressed a hope that the State will be authorized to take over maintenance costs and obligations of the arterial routes when built. He said, too, that projects requiring the demolition of homes must await easing of the housing situation.

New Link-Belt Offices

Two new sales offices in the midwest and one in the south have been opened by the Link-Belt Co. of Chicago, manufacturer of machinery for handling materials and for transmitting mechanical power.

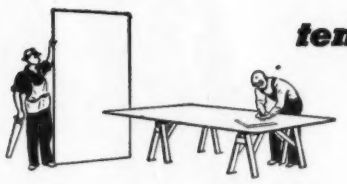
M. J. Parykaza, District Sales Engineer, will be in charge of the new office at Moline, Ill., located at 1608 Fifth Ave. In Ohio, L. R. Clark will supervise sales from offices in the Temple Bar Bldg., Cincinnati 2. Alabama service will be available through C. C. Wiley, Comer Bldg., Birmingham 3.

Protective Face Masks

Face masks for the protection of workmen against dusts, vapors, and specific gases are featured in a new 4-page bulletin issued by Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh, Pa. These masks filter the air that the worker breathes, and provide protection against injurious elements. The full masks feature an all-vision facepiece and shatterproof goggles. Copies of the leaflet, Bulletin ED-11, can be obtained by mentioning this notice. Write to the above address.

Reconversion Housing makes necessary the allocation of Douglas Fir Plywood

---- as a result the supply situation is being temporarily aggravated



The need for millions of homes, as called for by the Reconversion Housing Program, means that a substantial proportion of the Douglas fir plywood industry's current production is being allocated to housing contractors, stock cabinet manufacturers, prefabricators and distributors.

As a result, the supply situation for all other industrial and construction uses will continue difficult in the immediate future. However—more plywood is being produced today than in pre-war years, and once the present overwhelming demand for housing has subsided, supply for all users should be adequate. Anticipate your needs as far in advance as possible—and discuss your requirements with your regular source of supply.

DOUGLAS FIR PLYWOOD ASSOCIATION • TACOMA 2, WASHINGTON

Although Douglas fir plywood is critically short today, it is almost indispensable for many projects—for concrete form work, for signs and displays, for boat building, for railroad car construction, and for scores of other industrial and commercial uses. In such cases it is well worth waiting for. It saves time and labor—does a better job.

DOUGLAS FIR PLYWOOD
LARGE. LIGHT. STRONG.
Real Wood PANELS

FOR ROADS LIKE THESE

The swirling, chopping action of these tines does the job.

ARIENS AGGMIXER

IS ESPECIALLY DESIGNED FOR SECONDARY ROAD CONSTRUCTION . . . .

WITHOUT displacing the materials on the road surface, ARIENS AGGMIXER may be used wherever aggregates are used, such as all typs of bitumens, cements, chlorides, clays, etc. It thoroughly pulverizes, mixes, and aerates the aggregates with the binder used, doing a thorough job, rapidly and economically, either wet or dry. It is equipment used with other general purpose road equipment that not only produces better work with less equipment, but will lower the cost of the work accomplished.

Ariens AGGMIXER is safe and easy to operate . . . adjustable to any tractor . . . simple and positive hydraulic adjustment for depth. Made in 4 sizes with normal cutting widths 4', 5', 6', and 7'.

Write today for complete job facts and name of nearest distributor.

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BUY BONDS BACK THEM

Mark well this button. It is worn by the men and women honorably discharged from the armed services. Though they are now in civilian clothes, let's not forget their service to our country and to us. They still rate our every consideration.

Big Yardage Moved On Grading Contract

Work on New Parkway Is Pushed With the Use of Varied Equipment to Suit Job Conditions

✦ ANOTHER link in the Wilbur Cross Parkway, Connecticut's newest express highway, is well under way this year. A grading and drainage contract is being pushed from North Haven north to Wallingford in the south-central part of the Nutmeg State. This 5.7-mile contract was awarded last autumn by the Connecticut State Highway Department to D. V. Frione & Co., Inc., of New Haven, Conn., on its low bid of $611,000. The contractor started work early in October, 1945. He expects to be finished with his part of the job by the end of this year, if he is successful in getting the added equipment which he greatly needs. Paving will be done at some later date.

D. V. Frione & Co. wasted no motions in getting started on the project, putting its earth-moving equipment into action while the autumn weather was still mild. Since this parkway has a roadway width of 92 feet, grading can be expected to be heavy. So the principal item on this job is the earth work, which totals 920,000 cubic yards. Of this amount 350,000 yards is excavation; 500,000 yards, dirt borrow; and 70,000 yards, gravel borrow. To handle properly such a big highway earth-moving project, the contractor selected a well balanced fleet of equipment. He spread it out to advantage within the limits of the job, and located it where the length of haul is best suited for the most economical operation.

The Wilbur Cross Parkway begins at the eastern end of the Merritt Parkway just west of New Haven. War prevented the complete construction of any of the proposed north sections of the parkway, but eventually it is expected to continue to the capital at Hartford. With the close of hostilities, the Highway Department at once put wheels in motion to place some of these parkway sections under contract. This job, which is located only 12 miles north of New Haven, was among the first of them to get under way.

New Location

Right-of-way for the new parkway, which of course is all new location, required a minimum width of 300 feet. In several places a much wider strip was taken where the road parallels the Quinnipiac River along its west bank. Here the taking line had to extend to the river; otherwise the parcels of land remaining along the bank would be completely cut off from the Hartford Turnpike which lies west of the parkway. South of this new section is a portion of the parkway that had been graded in 1941-42 but had never been paved because of the war. To the north, two other sections are under contract, one to the A. I. Savin Construction Co. of East Hartford, and the other to the Lane Construction Co. of Meriden, Conn.

C. & E. M. Photo

A Marion 1½-yard shovel loads a Sterling 5-yard truck in a cut on the D. V. Frione & Co. grading contract on the Wilbur Cross Parkway.

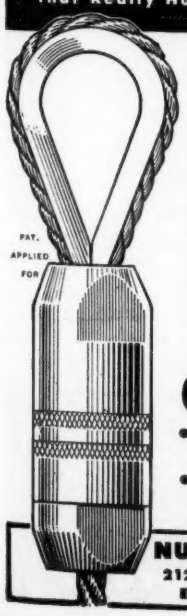
This contract calls for completion of the road to subgrade only, construction of a twin 8 x 6-foot concrete box culvert 125 feet long, and the laying of necessary drainage pipe. Both cut and fill slopes for the 92-foot roadway are normally 2 to 1, but they vary somewhat with the depth of the cut or fill. Eventu-

(*Continued on next page*)

NEW! BETTER!

Cabl-ox

THE NEW WIRE ROPE CLAMP
That Really Holds the Line!



CABL-OX clamps work on a brand new wedging principle. Holding power increases with the load and exceeds tensile strength of rope used. Does not crush and weaken rope like old style U-clips. Assembly is fast, neat . . . saves breakdowns, equipment, injuries and expense. Can be used over and over. Cadmium plated.

Cabl-ox

- **Made in all sizes from 1/16" to ¾". For all wire rope applications.**
- ***Ask your distributor or write for illustrated folder and prices.***

NUNN MFG. CO.
2125 Dewey Avenue
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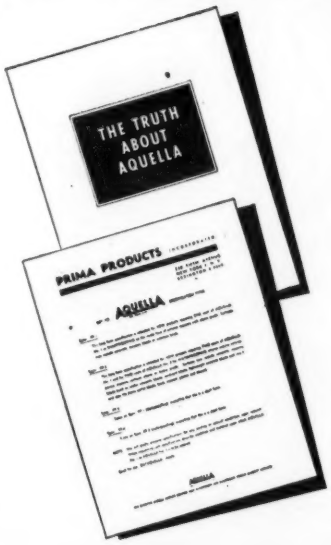
HERE IS INFORMATION YOU'LL WANT FOR YOUR WATERPROOFING FILE



SEND FOR "THE TRUTH ABOUT AQUELLA" brochure containing the story of how Aquella was developed, along with complete technical data. It answers questions, such as: What Finish Does Aquella Produce? On What Surfaces May Aquella Be Used? How Are Surfaces Prepared for Aquella? How Is Aquella Applied? What Is the Covering Power of Aquella? With this brochure, you will have the answers to these, and countless other questions, that will arise as more and more people ask what Aquella is and does. We hope you will find it a notable contribution to your Waterproofing Library.

SEND FOR "KEY TO AQUELLA SPECIFICATION TYPES". Here you will have a handy reference sheet that will simplify the preparation of specifications for both waterproofing and damp-proofing of all types of porous masonry surfaces. It outlines scope of work...materials...workmanship and application...preparation of surfaces...mixing and application.

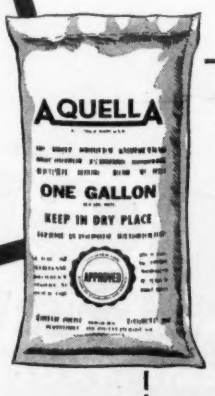
THE PRINCIPLE ON WHICH AQUELLA WORKS

Aquella is a white powder, composed of properly balanced, and very finely ground, inorganic ingredients. When mixed with water it produces an excellent waterproof, damp-proof and decorative surface coating for interior and exterior porous masonry surfaces. Aquella contains no organic binder, hygroscopic salts or stearate. Because of its minutely dispersed aggregates, Aquella fills and closes each microscopic pore of the surface to which it is applied.

Contrary to the shrinkage phenomena of most painted surfaces, Aquella expands minutely upon curing, insuring a quantitative filling of the pores and a better bond. Because of the filling of the pores with Aquella, the presence of a hydrostatic head of water on the unprotected side does not impair the integrity of the treated surface nor its property to resist capillary action, or seepage of water.

SEE DATA IN SWEET'S CATALOG

LOOK FOR FULL-PAGE ADVERTISEMENT, THE FIRST OF A SERIES ON **AQUELLA,** IN THE JULY 27th ISSUE OF THE SATURDAY EVENING **POST**



AQUELLA

The Mineral Surface Coating That Makes Interior and Exterior Porous Masonry Surfaces Watertight!

MAIL THIS COUPON—TODAY!

Prima Products, Inc.
Dept. X.
10 East 40th Street
New York 16, New York

Please send me, without obligation:
"The Truth About Aquella" brochure.....( )
"Key to Aquella Specification Types".....( )

Name.....

City.....State.....

Address.....

Please check whether you are an Architect ( ), Engineer ( ), Building Contractor ( ), Waterproofing Contractor ( ), Building Material Dealer ( ).

Grading Contract

(Continued from preceding page)

ally this will become a divided highway with a 20-foot grassed center strip enclosed within curbs, separating two 23-foot pavements of 8-inch reinforced concrete flanked by 8½-foot shoulders. The Quinnipiac River had to be relocated for 1,200 feet of its length in a new channel dug 60 feet wide and 11 feet deep. Banton Street in North Haven also had to be relocated in a 2,000-foot stretch to eliminate the need for an overhead bridge. By putting the street between the parkway and the river at this point, no such structure was necessary.

Grading

Before grading operations could start, about 50 acres of land had to be cleared. Power saws cut down large trees and shovels dug out the stumps. The earth is a combination of sand and gravel which is moved with shovels and trucks or tractor-scraper units, depending on the length of the haul and the workability of the material. The highest fill on the job averages 31 feet for a 700-foot stretch. The deepest cut is 24 feet, extending along 800 linear feet of parkway; a second cut of the same depth is about 500 feet in length.

For hauls averaging 500 feet, tractors and scrapers are used. On this work the contractor has two Bucyrus-Erie 8-yard scrapers and three Wooldridge 14-yard scrapers, each of which is pulled by an International TD-18 tractor. An additional TD-18 tractor with a Bucyrus-Erie dozer blade is used as a pusher when the going is tough, or else it does rough grading and leveling.

C. & E. M. Photo

For hauls averaging 500 feet, D. V. Frione & Co. uses tractor-scraper outfits on its 5.7-mile grading contract on the Wilbur Cross Parkway in Connecticut. Here an International TD-18 with Bucyrus-Erie blade serves as pusher for a Bucyrus-Erie 8-yard scraper pulled by a TD-18.

For the cuts or in the borrow pits, two Northwest 2½-yard and two Marion 1½ and 1¼-yard shovels were brought to the job. For the channel excavation a Marion 450 dragline was used, equipped with a 60-foot boom and a Page 1¼-yard bucket. In the drainage work a Marion ¾-yard trench-shovel was used, also a Lorain 12-ton truck crane with a 40-foot boom and a ½-yard clamshell bucket. The latter unit is employed also to place riprap, and to dig excavations for head walls and drop inlets after the fills have been made. In hauls beyond the scraper limit or in rock work, four Model BX Macks with 5-yard rock bodies are used along with five 15-yard bottom-dump Euclids, four International 3-axle trucks with 7-yard bodies, and several Sterling trucks. The earth fills are placed in 1-foot layers and shaped to grade with three power graders, an Adams, an Austin-Western 99, and a Caterpillar No. 10.

Large Borrow

An insufficiency of fill material within the limits of the right-of-way forced the contractor to open up borrow pits to get the necessary dirt. One site, only ¼ mile from the north end of the job, will yield 100,000 yards of borrow. The remainder of the needed 500,000 yards will come from a pit west of the parkway beyond the Hartford Turnpike; it will require an average haul of 2 miles. In a regular 9-hour day, 5,000 to 6,000

(Continued on next page)

NEVER A BUMP IN A MILLION MILES

- FLEXCELL is the *approved* modern expansion joint material for all highway and general concrete slab construction. It's made of long, springy Celotex cane fibres. Compresses under pressure. Springs back when the expansion pressure is eased.
- That's why FLEXCELL keeps highways smoother—it never extrudes. It can be set flush or set below the slab surface with poured capping.
- FLEXCELL is light, easy to handle. Helps make concrete roads last longer. Proved by years of service on American roads—with "never a bump in a million miles."

Write for sample and complete information.

THE CELOTEX CORPORATION
Dept. CEM 7, Chicago 3, Illinois
World's Largest Manufacturers of
BITUMINOUS FIBRE EXPANSION JOINT MATERIAL

BUILT FOR *Your* BUSINESS

Whatever your hauling requirements, GMC's wide range of models from ½ to 20 tons offers you the exact kind of trucks you need to do your job. Postwar GMCs for construction, mining, quarrying, road building and other heavy duty operations are the best GMCs ever built for these uses. Gasoline models have engines of the same basic design as the famous "270" which powered nearly 600,000 GMC-built Army trucks. Diesel models are smoother and more powerful than ever. Both types have greatly improved chassis . . . with heavier frames and axles, sturdier clutches and transmissions and bigger brakes. GMCs are all-truck built to deliver peak power, performance and economy on the toughest jobs. . . . *They're built for your business.*

GMC TRUCKS *The Truck of Value*
GASOLINE • DIESEL
GMC TRUCK & COACH DIVISION • GENERAL MOTORS

C. & E. M. Photo
Most of the rock on the Frione contract was in one 600-foot cut containing about 27,000 yards. Here is one of the Ingersoll-Rand wagon drills used to prepare the blasting holes.

Grading Contract

(Continued from preceding page)

yards of dirt from these two sources is hauled in and spread on the roadbed with the use of shovels and trucks.

Of the 70,000 yards of gravel borrow included in the earth-work quantities, 60 per cent of it is scheduled to be spread in specific locations. The remainder is unassigned and is used wherever the soil conditions appear to warrant. This need is determined by the progress of the hauling equipment; if the going becomes too slow in soft footing, the gravel is used to stabilize the subgrade. It is spread in 6-inch layers over about 70 per cent of the project; in cuts it is 2 feet deep, while in fills the thickness varies between 1 and 2 feet according to conditions. Gravel comes from two sources at either end of the job, Wallingford and North Haven. The average haul is 5 miles.

Drainage Structures

In pouring the twin 8 x 6 x 125-foot box culvert, the contractor used batch concrete mixed at the site in a Koehring 27-E paver. For the other drainage structures, such as drop inlets or culvert head walls, concrete was mixed on the job in truck-mixers. It was purchased from the Foxon Traprock Co. of New Haven, which is a subsidiary of D. V. Frione & Co., the contractor. The concrete was delivered to the job site after a 12-mile haul from the plant in four Jaeger 3½-yard mixers, mounted on International 3-axle trucks.

Rock Excavation

The rock found on the job is traprock for the most part, with some areas of red sandstone. The bulk of the traprock was in one 600-foot cut which contained 27,000 yards of rock varying in depth from 6 to 24 feet, and starting at the surface of the ground. Drilling equipment included four wagon drills, three Ingersoll-Rand and one Cleveland, and six Ingersoll-Rand Jackhammers. Since the rock work was centralized in this one area, the contractor decided on the use of a receiver tank for air storage, to insure more efficient operation in the drilling. Four compressors, an I-R 500-cfm, two I-R 315-cfm, and a Schramm 105-cfm, supplied air to the tank, which was equipped with T-connections for the drilling equipment. At times, when some ditch work with a jackhammer was required at another location, the smallest compressor was taken away.

Holes were drilled on an average of 5-foot centers with 1¼-inch drill steel in the wagon drills. Lengths began at 6 feet and increased to 12, 18, and in some cases to 24 feet. On the deep drilling, 2¾-inch bits were used at the start, and these were reduced 1/16 or ⅛ inch in size as the holes got deeper and smaller. In the traprock, a hard igneous formation, the bits had to be changed every 5 or 6 feet. The usual procedure was to drill about 2 feet below the depth of the required grade; thus if 18 feet of material had to be removed the holes were made 20 feet deep. The jackhammer drills were employed on the shallower holes. As soon as the holes were completed, the openings were plugged with small pieces of wood cut from the branches of trees, to prevent their getting filled with dirt before they could be charged.

In the traprock both 40 and 60 per cent du Pont dynamite was used. In a typical 20-foot hole the 3 to 4 feet at the bottom was filled with 60 per cent dynamite; the rest of the hole to with-

(Concluded on next page)

AD 164

Everybody has commented on the really beautiful four color illustrations contained in the VICTOR Bulletin Form 20 . . . it covers fine welding and cutting equipment . . . it will be yours, free, for the asking. Write us today for your copy.

VICTOR EQUIPMENT COMPANY • 844 FOLSOM ST., SAN FRANCISCO 7, CALIF.

On the small jobs too

YOU CAN MAKE MORE MONEY

with **MICHIGAN**

MOBILE SHOVEL-CRANES!

MODEL T-6-K
⅜ YD. SHOVEL
6 TON CRANE

3/8 YD. and 1/2 YD. SHOVELS
• 6 to 12 TON CRANES •
•
FULLY CONVERTIBLE
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AIR-CONTROLLED CLUTCHES
•
ONE-MAN OPERATION
•

THERE'S *real money* for you in those smaller jobs! Especially when you take advantage of the *truck mobility, operating speed* and *versatility* of the famous MICHIGAN Mobile SHOVEL-CRANES. They consume little time traveling from job to job — in fact, they get there almost as soon as an ordinary truck. On the job, their Fingertip Air Controlled Clutches enable operators to finish the work in a hurry. And when change of attachments is necessary, conversion can be made with a minimum of effort, in a couple of hours . . .

It will pay you to find out about the advantages of MICHIGAN Mobile SHOVEL-CRANES and how they can boost your income by keeping profitably busy *all* the time — on small jobs as well as large! Write today for complete information on these money-making shovel-cranes — ask for Bulletin E-56.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR MICHIGAN

Grading Contract

(*Continued from preceding page*)

in 6 or 7 feet of the top was filled with 40 per cent dynamite. Then the hole was backfilled with tamping material. Better results were attained with that extra "kick" at the bottom of the hole.

To eliminate secondary blasting when a hard ledge was encountered at the top of the hole, a practice known as "decking the charge" was employed. As before, 60 per cent dynamite was put at the bottom of the hole, then 40 per cent. But in addition, the top 7 feet had 1 foot of stemming or earth at the bottom, followed by 2 feet of 40 per cent, and 4 feet of stemming to ground level. In this "decking the charge" two electric exploders were required, one for each layer of dynamite. Each, with its two wires, was placed about the center of the charge. The extra 2 feet of dynamite close to the top of the hole resulted in a good break-up of the hard surface ledge. An average blast took in about 75 holes or 400 pounds of dynamite; the size of the blast was reduced appreciably if houses were near by.

In sedimentary red sandstone, a more porous material, much of the effect from 40 or 60 per cent dynamite would be lost. Accordingly a specially adapted dynamite was used—Red Cross extra 40 per cent strength, with slow-acting qualities and low velocity. In an average 10-foot hole, the lower 5 feet was filled with dynamite and the upper half was then tamped with dirt. When blasted, the accompanying heaving action resulted in good fragmentation between bore holes.

Items and Personnel

The major items included are:

Excavation, roadway	350,000 cu. yds.
Dirt borrow	500,000 cu. yds.
Gravel borrow	70,000 cu. yds.
Concrete pipe, 12 to 72-inch	12,000 lin. ft.
Corrugated-metal underdrain, 6-inch	20,000 lin. ft.

A force of between 60 and 70 men are employed on the grading of this 5.7-mile section of the Wilbur Cross Parkway under the direction of Vincent J. Sullivan, Superintendent for D. V. Frione & Co. Supervising this work for the Connecticut State Highway Department are E. S. Lawler, Resident Engineer, and Mike Mozzochi, Chief Inspector. The Department is headed by William J. Cox, Commissioner, with Arthur W. Bushell, Deputy Commissioner and Chief Engineer. Leslie G. Sumner is Director of Engineering and Construction.

New Highway-Lighting Code

A new standard for highway-lighting practice has been issued by the Illuminating Engineering Society's Committee on Street and Highway Lighting. The Society has announced the purpose of the code as an assistance to technicians and a benefit to the public.

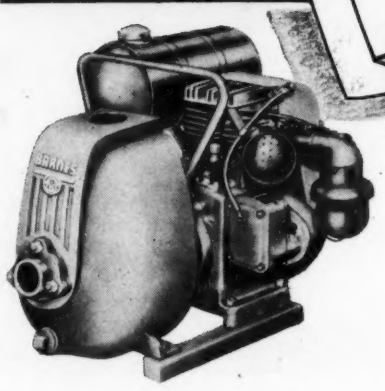
Its recommendations call for the fixed lighting of public ways of a grade appropriate to modern requirements, the IES says. "Where such lighting has been installed there has resulted a marked reduction in night accidents . . . studies have shown that traffic fatalities attributable to impaired visibility (after nightfall) total about 10,000 a year, over and above those that would be suffered if visibility at night were as good as it is in the daytime."

Copies of the "Recommended Practice of Street and Highway Lighting, 1945" can be obtained from the Street Lighting Section of the National Electrical Manufacturers' Assn., 155 E. 44th St., New York 17, N. Y.

TRINIDAD NATIVE LAKE ASPHALT

BARBER ASPHALT CORPORATION,
BARBER, NEW JERSEY

YOU CAN DO THE JOB
BETTER—FASTER—CHEAPER
WITH THESE "33,000 for 1" Pumps



The Streak (7M) 2-inch
STOCK DELIVERY ON THIS PUMP
NO WAITING—NO DELAY
Complete line of pumps ranges in size from 3,000 gallons per hour to 90,000 gallons per hour.

GOLDEN JUBILEE 1895 1945 50 Years of Progress

PUT Barnes Automatic Centrifugal Pumps to work on a hundred and one different jobs around construction, building, and road projects, and you will do your pumping better, faster, and cheaper.

For Barnes Pumps are the "33,000 for 1" Pumps. They deliver not 1,000! — not 10,000! — but 33,000 gallons of water for one gallon of gas used! That's economy of operation. They have stepped-up capacities. That's faster delivery. They are lighter in weight. That's better and easier handling. And they are built to stand the gaff.

Remember these better Barnes "33,000 for 1" Pumps when ordering or specifying portable, self-priming centrifugal pumps.

For sale by leading distributors in all principal cities.
If there is no distributor near you,
write, phone, or wire.

BARNES MANUFACTURING CO.
Quality Pump Manufacturers for 50 Years
MANSFIELD, OHIO

MARTIN CARRYHAUL TRAILERS . . .
"Make Hauling a Pleasure"
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Whatever your trailer requirements may be, there's a MARTIN CARRYHAUL TRAILER that will meet them squarely. MARTIN TRAILERS are known for their ease of loading, strength, safety and economical operation. 'Cross town or 'Cross country — let MARTIN CARRYHAULS carry the load for you.

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Firm _____
Position _____

The Alamo Construction Co. of Alamo, Tenn., has built 325 livestock ponds as well as handling terracing and other soil-conservation jobs. Among the equipment used in this work is the Caterpillar D6 with LaPlant-Choate bulldozer shown constructing a farm pond. Ray K. Wedgeworth of the firm is seen at the left.

Generator's Voltage Output Held Constant

Developed from wartime research, a constant-voltage generator has been introduced on 7½ and 10-kva Dieselectric units produced by the Witte Engine Works. The generator is said to keep motors running evenly and to keep lights bright regardless of changes in load.

No rheostat is required since the regulating circuit is built into the generator, which maintains constant voltage regardless of load changes. The operation is accomplished automatically through electric means, and the circuit is said to require no adjustment or other attention. Should failure of parts occur, the regulator portion can be replaced quickly, since it is constructed as a sub-assembly, Witte explains.

Full details on the value of this constant-voltage generator can be secured by addressing the Witte Engine Works, 1600 Oakland St., Kansas City 3, Mo. Tell the firm you read this report.

1946-47 Federal Aid Allocated to States

Apportionment of the second $500,000,000 authorized by the Federal-Aid Highway Act of 1944 has been announced by the Federal Works Administrator. Earmarked for the fiscal year 1946-47, the funds will remain available for Federal-Aid projects until 1948.

Under the 1944 Highway Act, $500,000,000 is provided in each of three fiscal years. The initial $500,000,000 authorization became available last October, when Congress decided that the war emergency had abated sufficiently to permit road construction to proceed.

Each annual sum is distributed as follows: $225,000,000 for the Federal-Aid highway system; $150,000,000 for secondary or feeder routes; and $125,000,000 for the F-A system in urban areas. The amounts apportioned to the states are as follows:

State	Highway	Secondary	Urban	Total
Ala.	$4,722,535	$3,739,291	$1,303,288	$9,765,114
Ariz.	3,240,289	2,240,966	262,168	5,743,423
Ark.	3,868,788	3,112,746	558,221	7,539,755
Calif.	9,017,519	5,161,445	8,122,233	22,301,197
Colo.	4,033,468	2,714,271	933,647	7,681,386
Conn.	1,395,047	765,980	2,607,495	4,768,522
Del.	1,096,875	731,250	204,057	2,032,182
Fla.	3,236,081	2,167,725	1,599,641	7,003,447
Ga.	5,644,683	4,307,866	1,622,008	11,574,557
Idaho	2,798,389	1,956,701	211,799	4,966,889
Ill.	8,833,305	4,752,492	9,510,696	23,096,493
Ind.	5,403,402	3,623,057	3,065,734	12,092,193
Iowa	5,554,317	3,971,103	1,592,107	11,117,527
Kans.	5,646,272	3,963,849	1,107,219	10,717,340
Ky.	4,213,497	3,412,080	1,299,529	8,925,106
La.	3,394,999	2,540,348	1,531,578	7,466,925
Maine	1,948,844	1,403,942	560,538	3,913,324
Md.	1,836,150	1,173,982	1,790,081	4,800,213
Mass.	2,942,606	786,455	6,612,615	10,341,676
Mich.	6,833,594	4,133,431	5,682,433	16,649,458
Minn.	6,043,897	4,163,523	2,206,152	12,413,572
Miss.	4,041,914	3,334,427	600,115	7,976,456
Mo.	6,664,077	4,565,111	3,151,158	14,380,346
Mont.	4,543,707	3,104,425	307,665	7,955,797
Nebr.	4,470,027	3,155,163	782,776	8,407,966
Nev.	2,868,649	1,922,269	60,613	4,851,531
N. H.	1,096,875	731,250	475,000	2,303,125
N. J.	2,864,310	1,041,631	5,527,987	9,433,928
N.Mex.	3,644,292	2,522,486	257,261	6,424,039
N. Y.	10,834,758	4,272,294	18,776,072	33,883,124
N. C.	5,431,717	4,452,710	1,492,475	11,376,902
N.Dak.	3,341,784	2,408,093	214,578	5,964,455
Ohio	7,893,255	4,650,034	7,539,574	20,082,863
Okla.	5,064,288	3,719,690	1,348,164	10,132,142
Oreg.	3,728,403	2,544,245	810,873	7,083,521
Pa.	9,182,796	5,268,563	10,517,201	24,968,560
R. I.	1,096,875	731,250	1,123,049	2,951,174
S. C.	3,056,219	2,521,950	654,032	6,232,201
S.Dak.	3,532,306	2,513,886	222,116	6,268,308
Tenn.	4,772,002	3,670,485	1,593,037	10,035,524
Texas	14,263,977	10,047,099	4,464,068	28,775,144
Utah	2,535,953	1,688,869	433,731	4,658,553
Vt.	1,096,875	731,250	211,884	2,040,009
Va.	4,112,674	3,190,410	1,491,272	8,794,356
Wash.	3,533,693	2,392,694	1,467,429	7,393,816
W.Va.	2,473,214	2,079,766	807,692	5,360,672
Wis.	5,430,678	3,678,326	2,654,468	11,763,472
Wyo.	2,794,242	1,896,157	133,049	4,823,448

In addition to these allowances, the District of Columbia, Hawaii, and Puerto Rico share $8,268,269 as follows:

Hawaii and the capital are each allowed $1,096,875 for F-A highways and $731,250 for secondary roads. Hawaii receives $393,416 for urban road work, and the District of Columbia, $1,146,477. Puerto Rico receives $1,107,133 for primary highways, $1,130,464 for secondary routes, and the sum of $834,529 for urban roads.

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Write for literature showing complete line of Floodlights and Lanterns

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Tug Hill, Howlett Hill, Long Hill, *any* hill — you can depend on the big, new Ward LaFrance heavy duty trucks. They're rugged, reliable and packed with power.

For economical hauling your best bet is a Ward LaFrance. Winter or Summer — 30° below or 110° in the shade — your Ward LaFrance will give you consistent performance day after day.

The new Ward LaFrance trucks and over-the-road tractors, both gasoline and Diesel, are designed, engineered and manufactured to meet all hauling requirements with maximum efficiency. Built to take a beating and stay on the job, these dependable trucks are setting new records for stamina and reliability.

For complete information about these trucks that are setting new standards of performance, see your local dealer. If no dealer has yet been appointed in your community, write direct to factory.

WARD MOTOR TRUCKS LA FRANCE

WARD LA FRANCE TRUCK DIVISION
Great American Industries, Inc.
ELMIRA, NEW YORK

The International Auto Wagon, built in 1907, was the forerunner of the modern line of International motor trucks. This vehicle was on display in Detroit last month during the Golden Jubilee celebration of the automotive industry.

Liquid Detergent For Steam Cleaners

A new liquid-type detergent for use in steam-cleaning equipment has been announced by The Penetone Co. The product is a liquid compound, soluble in water. It is poured into the cleaner's tank with the water, and requires no mixing. Its liquid nature eliminates the clogging of hoses and nozzles, Penetone says. The product is claimed to have a high alkalinity, and to remove rapidly stubborn accumulations of grease, oil, and grime from the surfaces and materials on which steam cleaning is used. It does not affect paint or other finishes.

Full details about this liquid-type cleansing agent can be obtained by writing The Penetone Co., Tenafly, N. J. Mention this report.

Plastic Hammer Head Does Not Mar Metal

An unbreakable plastic hammer head that will not mar the flat surfaces of metal has been announced by the Schmidgall Mfg. Co. It is designed for use in tool rooms, machine shops, repair departments, and similar applications.

Called Kant-Mar, this hammer has a Castex hard-plastic double head set on a base of light-weight aluminum alloys. A high-grade hickory handle completes the tool. The plastic head is die-cast, and is said to be non-breakable, fireproof, acidproof, and non-conducting. The hammer is made in three sizes.

Further details concerning the Kant-Mar are available from the firm at 307 Cass St., Peoria 2, Ill.

Motor Trucks of 1907 To 1946 45-Ton Units

International Harvester Co. celebrated its part in automotive progress during the recent Automotive Golden Jubilee in Detroit. An International Auto Wagon, vintage of 1907 and forerunner of the present International trucks, was a prominent feature of the celebration parade.

Harvester's history in the truck industry dates from the last decade of the 19th century, when some of its predecessor firms began experimenting with horseless carriages and gasoline-powered farm equipment. In 1906 the company approved the production of the Auto Wagon. This wooden-frame affair of 1907 was driven by a 20-hp 2-cylinder engine, and could carry 1,000 pounds.

Solid rubber tires of the "side-wire" mounted variety, 1¾ inches thick, were used on the Auto Wagon's wheels. The front wheels were 41 inches in diameter, and the rear 45. The vehicle had two speeds forward and one reverse. Its transmission incorporated a free-wheeling device. The final drive was by chain to the rear wheels through a countershaft.

As with the automobile, mentalities geared to the horse and wagon gave the Auto Wagon a bad time. However, engineering developments, in step with (and often leading) the march of progress, overcame the prejudices of the old school. Today International Harvester builds trucks for every highway and off-the-road duty, from ½-ton pick-ups to giant 45-ton off-highway units.

Hoist Firm Incorporates

Operated for the last five years as a partnership, the Chester Mfg. Co. of Lisbon, Ohio, has been incorporated as the Chester Hoist Co. Hal F. Wright, founder of the firm, is President, Mary T. Wright is Vice President, and Harry E. Hill, Secretary-Treasurer. The firm plans to expand its line of chain hoists and allied products.

FINISHING AT THE RIGHT TIME, NO MATTER HOW STIFF THE CONCRETE, IS EASY WITH THE KOEHRING LONGITUDINAL FINISHER

• • •

At the stage where concrete should be finished—after the concrete has almost completely subsided, when there is no longer any danger that crown contours will flatten out after finishing — concrete is often too stiff for finishing by hand tools.

But no matter how stiff, the concrete is workable for the 6,700 pound Koehring Longitudinal Finisher. It's able to work where you want it to work — well back of the paver. Crown contours go on to stay, as specified, because once finished at the correct stage, concrete will not flatten out or slip.

KEEPS UP WITH ANY PAVER

Koehring Longitudinal Finisher offers other important advantages as well. First: It finishes fast, keeps right up with any paver. No need to hold back your paver while the finishing crew catches up. Second: Finishing labor costs are often substantially reduced. Third: Crowns are exact to specifications, mechanically perfect every time, from beginning to end of the shift.

KOEHRING COMPANY • *Milwaukee 10, Wisconsin*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

CR

Hose
BOOTS or CLOTHING
Call YOUR *Continental* BRANCH

Immediate Delivery from Local Stock
BRANCHES

Baltimore, Md.	Indianapolis, Ind.
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Hartford, Conn.	San Francisco, Calif.

Syracuse, N. Y.

CONTINENTAL RUBBER WORKS
ERIE, PENNSYLVANIA, U.S.A.

Welding for Progress—$200,000-Award Program

Persons engaged in the design, construction, or manufacture of steel structures and products will have a chance to receive large cash awards in a "Design-for-Progress" program being sponsored by the James F. Lincoln Arc Welding Foundation. More than 450 awards totaling $200,000 are to be made.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may be interested in these classifications for which awards will be made: bridges, abutments, caissons, dams, tunnels, construction machinery and parts, tanks and other containers, pipe lines, penstocks, watercraft, maintenance, commercial welding, and research and education.

The program is intended to encourage study and the preparation of papers on design, research, and education, and the application and use of arc welding. The results of the program will be made generally available, and its sponsors believe that it will benefit industry as a whole.

Complete details of the $200,000 "Design-for-Progress" Award Program can be obtained from the Secretary of the James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio. Entries must be in by June 1, 1947.

Engine Preheater-Unit Producer Changes Name

A change in both name and location has been effected by the Kimberlin Mfg. Co. of Spokane, Wash. The firm makes the Kim Hotstart, a preheater for gasoline and diesel engines, and is now known as the Kim Hotstart Mfg. Co. Its new address is W. 917 Broadway, Spokane 11, Wash.

Kim Hotstart is designed for use on either stationary or mobile engines. It heats up the engine by controlled percolator-flow action of coolant fluids in one direction only. It is built in two types—electric or gas-burner heated—and is adaptable to diesel or gas engines.

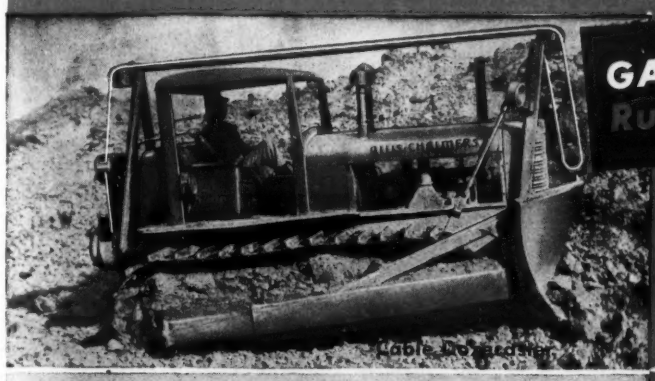
Full details about this heater are available to readers of CONTRACTORS AND ENGINEERS MONTHLY who write to the firm and mention this notice.

Bivins Gets Detrex Post

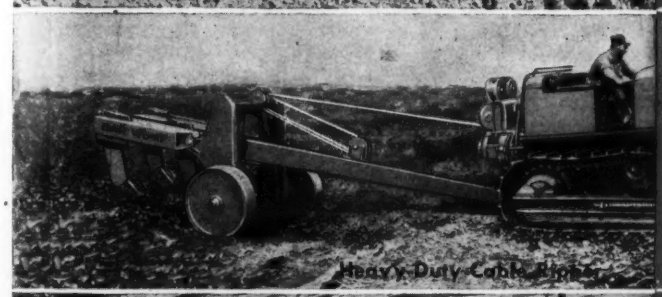
The appointment of S. H. Bivins as Manager of Western Regional Industrial Sales has been announced by the Detrex Corp., Detroit. He has been with the firm, which manufactures equipment-cleaning units, since 1936, and was Manager of the Ohio Division until recently. His headquarters will be in Chicago.

Down-to-Earth Engineering

GAR WOOD Cable Controls Feature Rugged Simplicity and Direct Action Pull



Cable Motorgrader

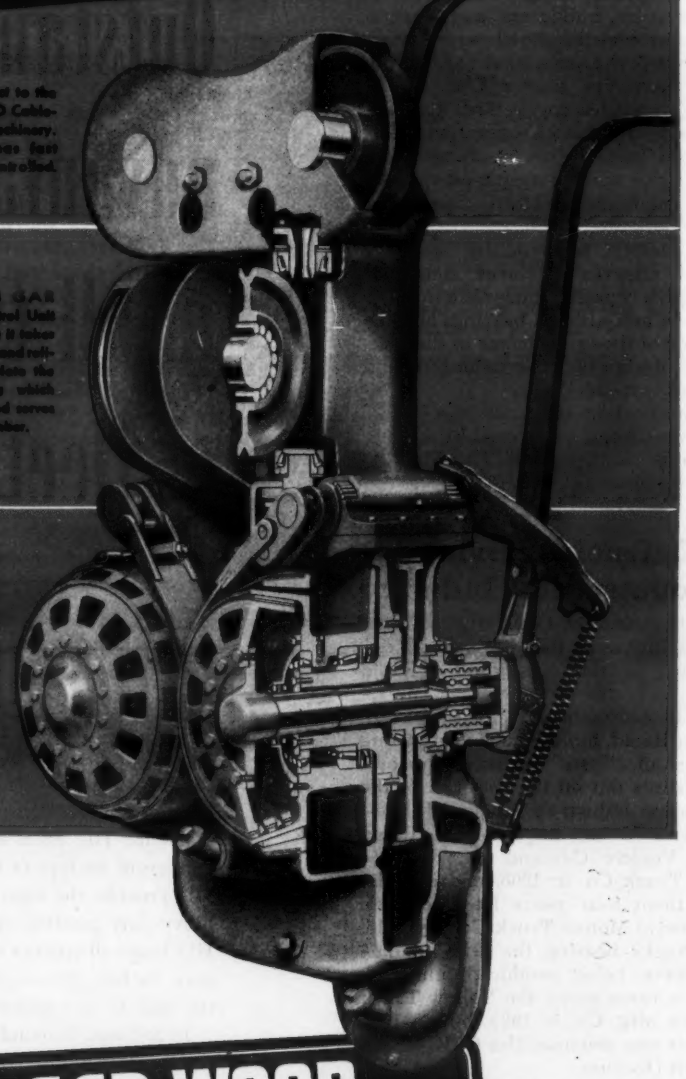

Heavy Duty Cable Ripper

4-Wheel Cable Scraper

The cable goes direct to the job in GAR WOOD Cable-Controlled Road Machinery. As a result, it has fast action, positively controlled.

The Joe-proved GAR WOOD Cable Control Unit (right) has everything it takes for smooth operation and reliable performance. Note the sturdy steel housing which prevents distortion and serves as a lubrication chamber.

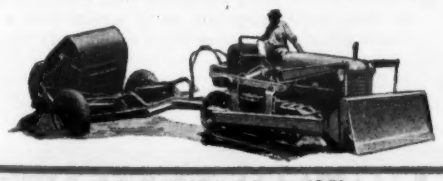
Outside shoebox and servo-type, self-energizing brakes cool themselves and are readily accessible. Roller bearings throughout and worm-type gears keep adjustments at a minimum.



PROVED through the years on the toughest of jobs. Made more rugged than ever by the lessons learned in war action on every front, from Guadalcanal to Okinawa and from Oran to Berlin.

GAR WOOD Road Machinery and the famous GAR WOOD Cable Control Power Unit offers practical design and sound construction, well engineered and honestly built—equipment that *holds together* and can be operated with an absolute minimum of down time. *If it's* GAR WOOD, *it's good.*

See your Allis-Chalmers dealer. He'll be happy to give you all the facts and show you Gar Wood Earth Moving Equipment *on the job* in your own vicinity.


Gar Wood 2-Wheel Hydraulic Scraper and Bulldozer

Gar Wood Hydraulic Dozecaster

GAR WOOD ROAD MACHINERY WITH ALLIS-CHALMERS DIESEL POWER

Sold Through ALLIS-CHALMERS Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, INC.
DETROIT 11, MICHIGAN

OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • TANKS • WINCHES AND CRANES • HEATING EQUIPMENT • MOTOR BOATS

The new Caterpillar rear double-drum cable control is designed for the operation of large dirt-moving scrapers, bulldozers, and similar equipment with D6, D7, and D8 tractors.

Rear Cable Control Is Double-Drum Unit

A new heavy-duty rear double-drum cable control is being manufactured by the Caterpillar Tractor Co. for use on D6, D7, and D8 tractors. The control is said to embody numerous refinements, and to be designed for the heaviest service imposed in the operation of large scrapers, bulldozers, and rippers.

The multiple-disk clutch with metallic facings is the same kind used in the firm's track-type tractor line. Brake release and clutch engagement are synchronized for smooth operation. Designed to permit free spooling when desired, the control responds quickly with a minimum of effort, Caterpillar says.

The unit is featured by specially grooved sheaves of large diameter, great brake capacity, longer life through the use of anti-friction bearings and the recessing of the cable drums in the case, compact design for close mounting, and a rugged cast-steel case.

A specification sheet for the No. 25 cable control can be secured by writing Caterpillar at Peoria 8, Ill. Mention this news item.

GMC Trucks Serving Country and Industry

The thousands of GMC trucks on the nation's highways today are direct descendents of the one-cylinder Rapid motor truck, one of the early gasoline-powered commercial vehicles. From the first Rapid, built in 1902, has sprung a series of "firsts" in truck history, GMC points out on the occasion of the automotive industry's Golden Jubilee.

General Motors acquired the Rapid Motor Vehicle Co. and the Reliance Motor Truck Co. in 1908, and consolidated them four years later to form the General Motors Truck Co. By 1916, 4,000 trucks bearing the GMC nameplate were being produced annually. The firm came under the Yellow Truck & Coach Mfg. Co. in 1925, but in 1943 this unit was renamed the GMC Truck & Coach Division.

Pike's Peak succumbed to the truck in 1909, when a Rapid GMC made the first truck ascent. GMC gave the truck industry its first Syncro-Mesh transmissions in heavy units, its first 4-wheel brakes, its first 2-range transmission, dual-performance rear axle, and recirculating ball-bearing steering. It pioneered the use of 6-cylinder truck engines, full-pressure lubrication, and Turbo-Top pistons. It introduced 2-cycle diesel engines in trucks, and the gross vehicle rating instead of ton rating as a means of determining true truck capacity. The first complete line of standardized truck engines was offered by GMC.

Model 16 in World War I and the 2½-ton GMC truck in the recent conflict were among the equipment serving our armed forces. "Six-by-six" trucks and the imagination-catching Ducks also played an important part in this victory. In all, nearly 600,000 GMC truck units were supplied the armed services in World War II.

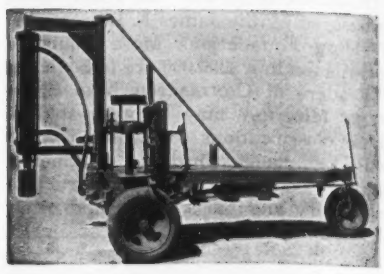
As the automotive industry celebrates its Golden Jubilee, the GMC Truck & Coach Division looks to the future. An expansion program is under way to increase by 40 per cent the floor space at the Pontiac, Mich., plant.

Pipe Tools Illustrated

Shop superintendents will be interested in a condensed catalog of pipe tools and other machines which has been issued by Beaver Pipe Tools. The 4-page folder lists and illustrates an extensive line of power and hand tools for various pipe-handling duties. Copies can be obtained by mentioning this news item when writing Beaver Pipe Tools, Warren, Ohio.

Junior CONCRETE RAPID PAVEMENT BREAKER

Fastest Pneumatic Method
Cuts Cost and Time
Works Inside or Out
Good for all Small Jobs



Ask about our HEAVY-DUTY TYPE
RAPID PAVEMENT BREAKER CO. 1517 Santa Fe Avenue Los Angeles 21, Calif.

Outstanding advantages in all types of fleets

Stanolube HD

Stanolube HD offers outstanding advantages regardless of the type of fleet you operate. Stanolube HD provides the ideal lubricant for any make of heavy duty gasoline or Diesel engine. Stanolube HD keeps all engines clean and at peak performance. In fact, the tougher the service the greater the need for this heat-resistant, detergent oil.

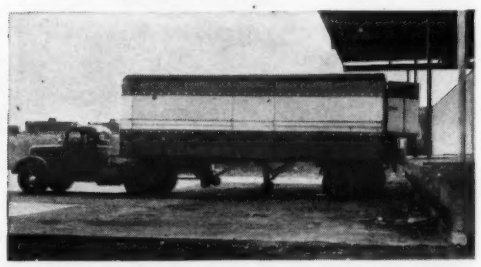
In addition, Stanolube HD will reduce deposits and wear in transmissions. Where transmissions tend to overheat and break down ordinary gear lubricants, the inhibitor in Stanolube HD will reduce oil oxidation, just as it does in an engine, and minimize deposit formation.

A Standard Oil Automotive Engineer is ready to help you put maintenance-saving Stanolube HD to work on your fleet. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois.

...in Contractors' Equipment

Stanolube HD can be used on heavy duty gasoline and Diesel powered equipment. Contractors need stock only one oil—eliminates danger of applying incorrect lubricants.

...in Truck Fleets

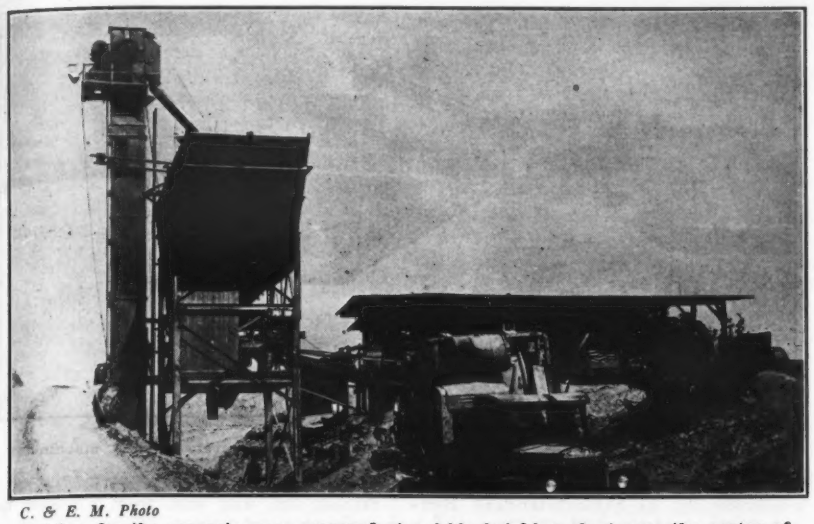


Both heavy duty over-the-road trucks and light trucks in delivery fleets can use Stanolube HD to advantage. The tougher the service the greater the need for this heat-resistant, detergent oil.

...in Bus and Taxi Fleets

Diesel or gasoline powered buses, taxicabs, other passenger car fleets now being lubricated with Stanolube HD ... all these widely varying types of service show a remarkable reduction in engine deposits and longer operation between overhauls.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE



C. & E. M. Photo
Batches for the concrete were prepared at a 4-bin batching plant near the center of the job. An ample supply of bag cement was stored on a covered platform, at right.

New Irrigation Canal Built With Special Units

(*Continued from page 2*)

tated faster than the other in rounding curves on the canal. More wheels had to be put under each side. Cross members were added to give extra strength. A Lincoln electric welding machine was installed aboard the machine to make emergency repairs. With these alterations, the machine dressed about 60 feet of canal per hour to a tolerance of ¼ inch in 10 feet.

Preparation for Concrete

Following the fine-grader came a reinforcing gang of from six to ten men. They installed 8 x 8 x 6-gage steel-wire mesh reinforcement on the sides and bottom of the canal. This reinforcing was laid flat on the finished grade, for the concrete-placing machine that was used had a spreader bar which slid along underneath the mat and raised it just enough to center it in the middle of the concrete slab.

When the steel reinforcement was laid in place, a laborer removed what little loose earth lay at the top of the slope, and the section was ready for concrete. A man with a water hose sprinkled the subgrade just ahead of the special placing machine.

Special Concrete Machine

It may be that the placing of concrete on the sides of the canal could have been done, though not as economically, without special equipment. But the Shea Co. also employed a Wood-manufactured concrete-placing and vibrating machine, which was used to excellent advantage in the placing of a relatively thin slab, 3½ inches, on a 1½ to 1 slope.

The machine was built to the same general dimensions as the fine-grader, with a dump hopper which deposited the concrete along both slopes and the bottom. The same power was used to pull this machine along as was used on the grader. In addition, a length of cable was stretched from an electrically powered winch at the front of the machine to each railroad rail. Tension on these two cables helped the machine along.

Alterations to this machine included a swivel-connected conveyor belt and a main hopper to take concrete from truck-mixers. The 24-inch conveyor, 40 feet long and carried on 12 sets of idlers, was driven by a Fairbanks-Morse electric motor. The ground end of the conveyor was wheel-mounted on two Firestone 9.75 x 20 12-ply heavy-duty bus tires.

Main power for the concrete machine was furnished by an International UD-18 diesel engine, driving a 75-hp Fairbanks-Morse generator. This generator furnished the power for driving the machine, for electric built-in concrete vibrators, and for the electrically powered dump car.

Placing Concrete

The truck-mixers operated from a 4-

(*Continued on next page*)

C. & E. M. Photo
Concrete finishers put the final touch on a contraction joint from platforms located on the joint-cutting machine.

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

•

The Hayward Company
32-36 Dey Street
New York, N.Y.

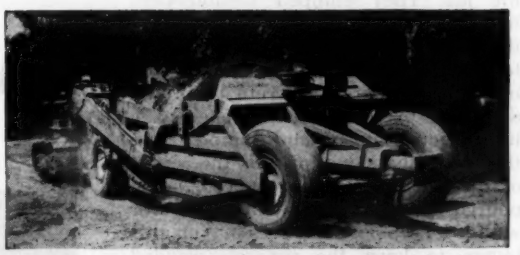
Hayward Buckets

Yards ahead in Performance

... because they are years ahead in practical engineering features ...

On job after job, you'll find the new LPC "Carrimors" outperforming other scrapers by a wide margin. They're getting bigger loads faster and with less power because every LPC feature — cutting edge, heel clearance, bowl design, hoist sheaves and apron operation — has been scientifically engineered to insure easy loading.

Regardless of the kind or condition of material, LaPlant-Choate's *exclusive* positive forced ejection gets the load out quickly and completely. Even rocks, stumps and sticky gumbo can't ever jam between the gate and apron. Moreover, the rear gate is positively returned *the full distance* every time by the weight of the apron, plus a special spring arrangement. So for lowest possible costs tomorrow, get complete facts today on the new LPC "Carrimors." LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland 3, Calif.



Low center of gravity, low over-all height and freedom from unnecessary dead weight also contribute to LPC's record of "lowest possible cost per yard."

The New 8 and 14 Yard LPC Carrimors*

*Reg. U. S. Pat. Off.

LaPLANT-CHOATE

Job-Proved Equipment... for owest ossible ost in Moving Earth

C. & E. M. Photo

A Bureau of Reclamation inspector takes a drink from a sanitary drinking-water dispenser set up by the contractor. Ajax paper cups were used.

New Irrigation Canal Built With Special Units

(Continued from preceding page)

bin batching plant near the center of the job. They dumped 4-cubic-yard batches of concrete to the conveyor of the concrete machine, which took it up to a double-bin compartment with sliding bottom doors. Concrete was then delivered to the 1-yard hopper of a little electric buggy, and dumped from the top of the slope towards the center of the canal. With the concrete being poured at a 1½-inch slump, a laborer with a long pole was necessary on this buggy to keep the concrete rodded loose. Otherwise it might not dump when the doors were opened.

Built-in electric vibrators then consolidated the concrete, assisted sometimes by electric vibrators hand-operated by men who worked on the upper side of the special placing machine. The concrete was prevented from running out behind the machine by means of a flat tailplate 48 inches wide immediately adjacent to and behind the placing hopper. As soon as the machine moved ahead sufficiently, a gang of eight finishers, working with steel trowels, put the final surface on the canal sides and bottom.

A hydraulically operated contraction-joint cutter was towed along with the placing machine. This rig cut dummy contraction joints on 15-foot centers, which were then finished by ½-inch-radius edging tools in the hands of four finishers on that machine.

The concrete was cured with light-reflecting white curing compound, applied at 120-psi pressure from another rig equipped with a 158-gallon reservoir, three nozzles, and two 1-inch pumps driven by Briggs & Stratton gasoline engines.

Concrete was batched in accordance with the following weights:

Sand	4,737 lbs.
Rock, No. 4	3,496 lbs.
Rock, ½ to 1-inch	3,797 lbs.
Water	1,015 lbs.
Cement	1,880 lbs.

This batch yielded about 4 cubic yards. Four Jaeger truck-mixers were used in hauling the concrete to the job, but this number was not usually enough to keep the spreading machine moving continuously, as Superintendent Rennebohm would have liked. However, it was absolutely impossible for the Shea Co. to purchase additional machines; in fact, the canal was shut down by the War Production Board for a short time during the war and then allowed to proceed.

In the first part of this 11-mile section of canal, with a normal water depth of 10.0 feet and 1.5 feet freeboard, 0.57476

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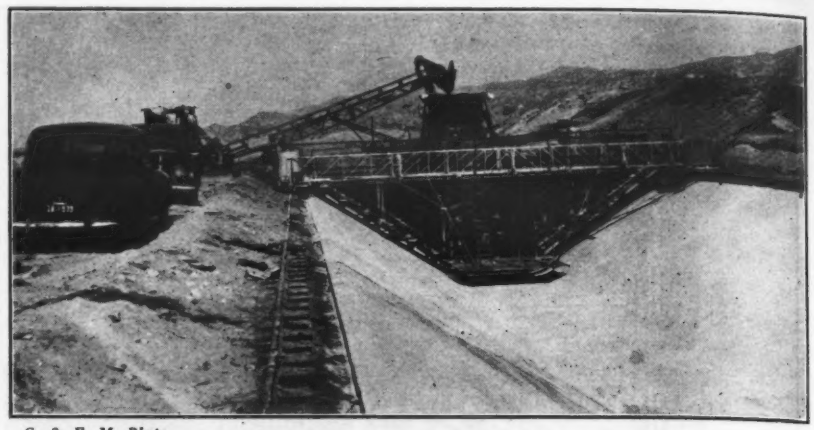


C. & E. M. Photo

Shown here is a view of the finished canal, with the concrete-pouring machinery appearing in the background.

Handle that road oiling contract more profitably with a Cleaver-Brooks Tank Car Heater

The quicker you get the oil or asphalt in the tank car on the siding up to application temperature and flowing into the distributors—the faster your road crews can get going and finish the job.

With a Cleaver-Brooks Tank Car Heater you can have hot, dry steam flowing to car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks Tank Car Heater requires less fuel and water.

Perfected — highly efficient — you can tow it with car or truck to tank car siding, construction site, material yard or other locations where you need steam.

The famous Cleaver-Brooks four-pass fuel travel means low fuel consumption; the turbine type condensate return system cuts water loss — every drop of condensate goes back to the heater under pressure.

Built for full capacity — full time work — Cleaver-Brooks Tank Car Heaters will give you the most in production hours on the job. Write for bulletins and complete information.

CLEAVER-BROOKS COMPANY
333 East Keefe Avenue, Milwaukee 12, Wisconsin

Write On Your Business Letterhead . . .
For the Bituminous — mix Calculator — a ready reference slide rule showing weight of mix needed in lbs. and tons in relation to width and depth of area to be covered.

Cleaver-Brooks

PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS

New Irrigation Canal Built With Special Units

(Continued from preceding page)

cubic yard of concrete per running foot was required. For the next, an enlarged part, with a normal water depth of 10.8 feet and 1.5 feet freeboard, the amount of concrete per foot was increased to 0.62147 cubic yard.

Job Details

The carpenter yard, where forms were made for structures, was located approximately in the center of the job, and forms turned out from there were hauled by truck wherever they were needed. Lumber was at a premium, and the carpenter foreman was called upon for some tricky layout work, especially around a float-well intake on the main wasteway.

The carpenter yard was equipped with a band saw driven by a U. S. motor, a DeWalt Model G2 power ripsaw, and 2 SkilSaws.

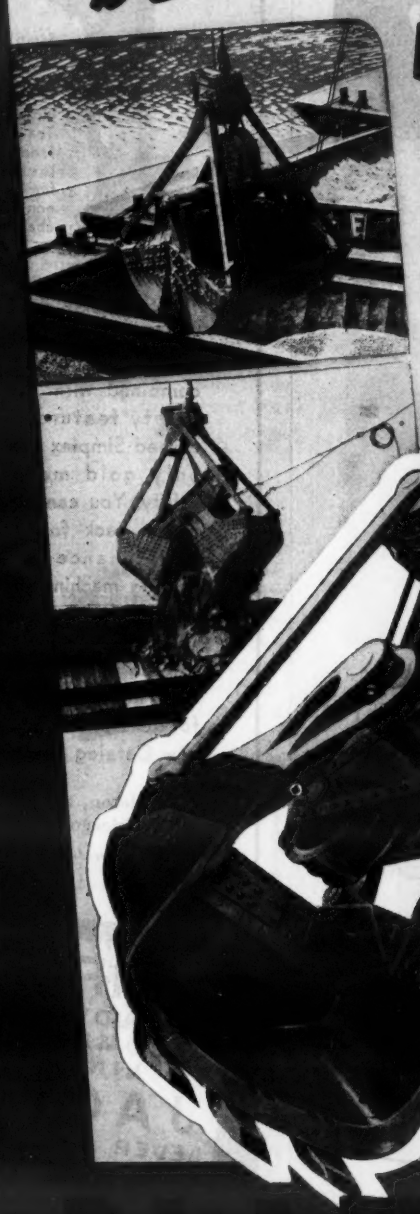
Drinking water on this job was hauled to sanitary barrels set up wherever gangs worked, and dispensed through Ajax paper drinking cups. By adhering to the rules of common sense in his safety policy, Superintendent Rennebohm enjoyed a good record on this job, particularly around the heavy special machines where it might be imagined that disastrous accidents could happen.

The No. 1 traffic artery in the U. S. is the Boston Post Road, between Boston and Washington, the PRA reports.

Vibrating-Screens Data

Vibrating screens for quarry or crushing-plant operations are described in a new 16-page bulletin just issued by the Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. The booklet, "Vibrating Screens", presents the complete line of Pioneer's screens. Details of construction are presented, together with specifications on types and sizes. Copies can be secured on mention of CONTRACTORS AND ENGINEERS MONTHLY.

You always get BLUE RIBBON PERFORMANCE WITH BLAW-KNOX BUCKETS



Good bucket performance means less time out for repairs and maintenance — constant pay loads on all kinds of digging and rehandling work — full utilization of crane capacities.

Catalog No. 1757 will show you how to select the exact bucket for your job. Send for it.

BLAW-KNOX DIVISION
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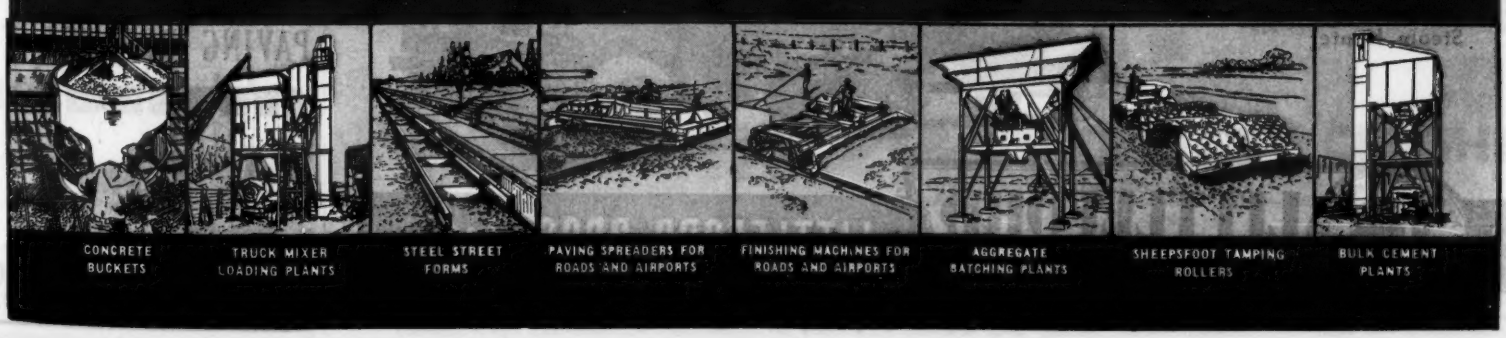
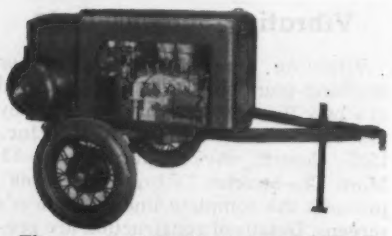




The new R-60 Smith air compressor is powered by a Ford engine and trailer-mounted for ready portability.

Trailer Compressor Has 60-Cfm Capacity

Powered by Ford Model A engines, Gordon Smith & Co. compressors are designed for many outdoor and indoor contracting and highway jobs. They are built in two models. One is mounted on skids, the other has a running gear for trailer connection.

The Ford Model A engine, with its 1-2-3-4 firing order, is reconditioned for compressor service. The compressor produces 60 cubic feet of air per minute at 80-pound pressure. Silencer-type air cleaners are used on the compressor intake, and an Air-Maze cleaner on the carburetor.

The unit has a 16 x 44-inch welded air receiver that has been tested for 200-pound pressure, a 17-gallon gasoline tank, and an 18-gage steel canopy. Mounted on 6:00 x 16 tires and disk wheels, the compressor has an overall size of 103 x 66 x 58 inches. Timken bearings are used in the hubs. A heavy ball-and-socket hitch serves for attaching the compressor to a truck or car when traveling.

Complete specifications on this general-purpose compressor can be obtained by writing Gordon Smith & Co., 425 College St., Bowling Green, Ky. Mention this news report.

Heads LeTourneau Sales

The appointment of Stanley D. Means as Domestic Sales Manager, a newly created post, has been announced by R. G. LeTourneau, Inc., Peoria, Ill. With the firm for the past ten years, he has been Industrial Sales Manager since 1945. His duties will encompass LeTourneau's sales in the United States, Canada, Hawaii, and Alaska.

Single-Operational Steel-Lifting Hook

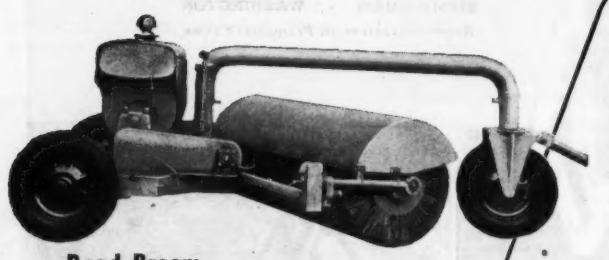
The handling of structural steel—beams, girders, channels, etc.—is greatly facilitated by a newly developed device, the Elizabeth Iron Works announces. Known as the Diamond Torque Hook, it is a one-operational lifting tool, said to eliminate the lifting, blocking, and hooking-up operations common to chains, slings, and other derrick attachments.

Two grippers mounted on an iron ring are applied to the object to be moved, the lifting power is engaged, and the section is in suspension almost at once. The torque action is developed when the load is applied, and increases in direct proportion to the weight of the sections being handled. Centering the load is not necessary, for the hook will not slip even though the steel is in a tilted position. The hook is supplied in 7,000 and 10,000-pound capacities.

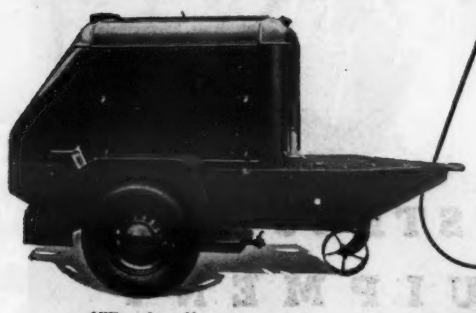
Further details concerning the Diamond Torque Hook are yours for the asking. Write the Elizabeth Iron Works, P. O. Box 360, Elizabeth, N. J., and say you read about it in CONTRACTORS AND ENGINEERS MONTHLY.

IT'S NOT WHAT YOU LIKE TO DO-BUT WHAT YOU DO THAT COUNTS

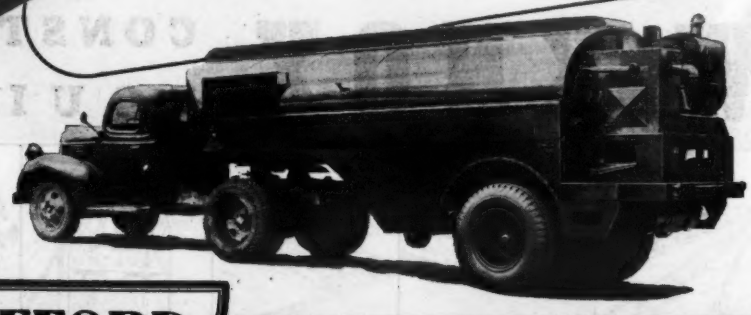
"Spray Master" Pressure Distributor



Road Broom



"Tankar" Steam Heater



Supply Tank

When those big Black Top Road, Highway or Airport Runway jobs are ready for Construction or Repair—do you *like to do* a modern efficient job—or do you *do* a modern efficient job?

If you have the right Equipment, engineered, tested and proven like Littleford "Spray Master" Pressure Distributors, Road Brooms, "Tankar" Steam Heaters, Supply Tanks, then there's no reason for not doing a perfect Black Top Job.

Let's take a look at these Littleford Units and see why they're efficient and modern. The "Spray Master" with Full Circulating Vacuum Flow Spray Bar circulates the material by Vacuum not pressure. Road Brooms have Hydraulic Tension Control on the Brush for adjusting Brush tension on Road surface. "Tankar" Steam Heater produces steam in two minutes' time. Supply Tanks can be built without the use of a frame—known as Littleford Frameless Constructed tanks. It's what you *do* that counts and you can count on Littleford Black Top Road Equipment.

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The Accepted General Purpose Jack

Simplex No. 22: 10-tons capacity, 12½" lift. Height closed 21¼". Toe lift 2¼" from ground level. Also furnished with non-rotating chain cap.

The Simplex No. 22 Jack has time-saving operating speed and lifting range, combined with the vital safety features which earned Simplex Jacks the only gold medal for safety. You cannot get a better jack for general maintenance work, for moving machinery, heavy crates and similar loads. This single-acting, ratchet lowering jack has long been industry's 1st choice for general work. Send for new Catalog No. 45.

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Write for descriptive circular

BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

Ottawa hydraulic front-end loaders for mounting on wheel-type tractors have a wide range of service. In addition to the bucket, a bulldozer blade, V-type plow, and snow bucket are available as other attachments.

Tractor-Loaders Have Wide Light-Duty Use

Two loaders for mounting on the front end of most types of wheel tractors are being made by Ottawa Steel Products, Inc. Hydraulically operated, the units find a wide range of service in light contracting and highway-maintenance work.

The Ottawa Industrial loader is designed especially for use with the standard-tread wide-front-wheel tractor. The Ottawa Farmer front-end loader is built for the row-crop tractor, which many contractors and highway departments have been using of late. However, many users have installed the Farmer model on an Allis-Chalmers W Speed Patrol.

These loaders require only minor alterations on the tractors, the manufacturer says. Angle-engineered massive side rails distribute the load over the entire tractor frame. The units have all-welded tubular and flat frame construction. There are no lift pulleys or cables. Up to 3,000 pounds can be handled by the loaders at the rate of two loads per minute, lifting to a height of well over 8 feet.

The Industrial model has a built-in control, with the hydraulic pump operating from the front power take-off of the tractor. The Farmer model comes in two styles, one having Ottawa's "plus-power package", and the other taking its power from the tractor's hydraulic system. Finger-tip control from the driver's seat is possible on both models. The driver is said to have clear vision at all times.

All-purpose and standard material buckets are available for each loader. Those for the Industrial have a ½-yard capacity, and are 48 inches wide; those for the Farmer handle 10 cubic feet, and are 42 inches wide. The all-purpose bucket features a semi-cut-away design, and has seven detachable teeth. A bucket lift of about 9 feet is possible.

Other attachments for the Ottawa loaders include a 7-foot bulldozer blade that has an adjustable pitch; a ⅔-yard snow bucket; a V-type snow plow for cutting a 7-foot-wide path; and boom extensions giving a 16 or 24-foot lift. Each of these can be attached with a minimum of difficulty.

Handling a wide variety of bulk material, loading pipe, setting poles, and many equally diversified jobs are said to be possible with these tractor-loaders. Full details and descriptive literature can be obtained from the Ottawa Steel Products, Inc., Ottawa, Kans.

Sand Point Aids Drainage

Digging a ditch for a tile sewer at a distance of less than 500 feet from the ocean gave the Espy Paving & Contracting Co. of Savannah, Ga., quite a problem. Before the sewer ditching could be initiated, considerable draining of the subsoil was necessary. Espy accomplished this by driving holes with a sand point powered by water pressure, and installing steel suction pipes to carry away the underground water. The sand point was driven from a crane mounted on a Caterpillar D7 tractor, and operating from its rear power take-off.

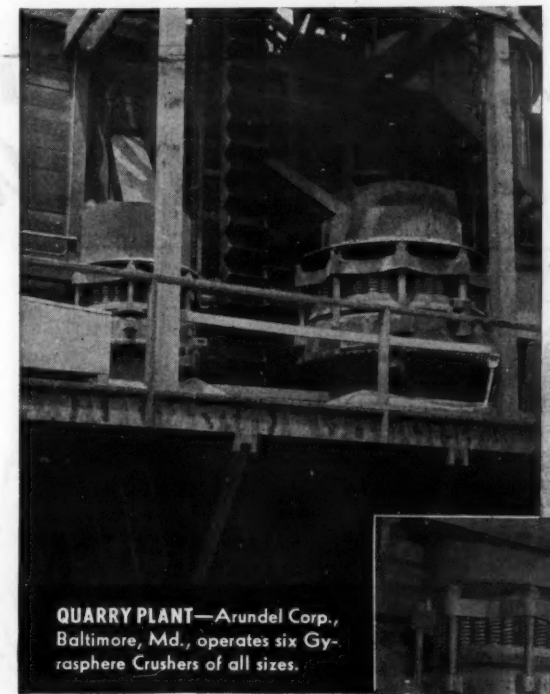
A crane mounted on a D8 drives holes with a sand point preparatory to installing suction drainage pipe.

Here's the Baby that does the work of 10 Men!

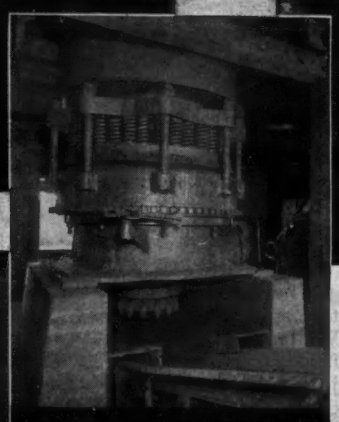
FOR clearing and cutting timbers and piles with speed and accuracy, this modern power tool is just what you need—especially designed to meet post-war construction requirements. Pneumatic model illustrated. Gas and electric models available also.

LOMBARD CHAIN SAWS

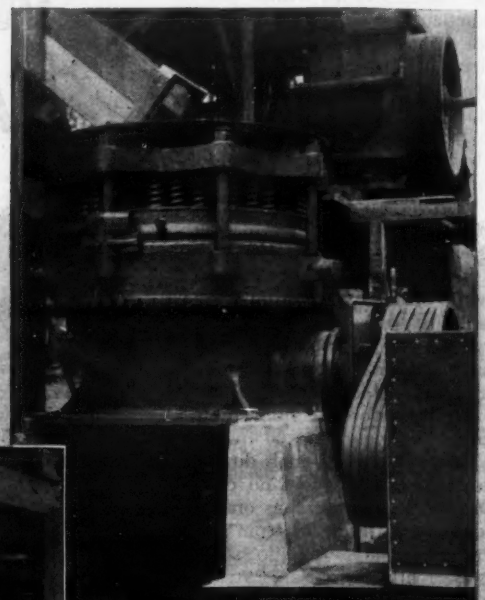
Mfgr'd. by Lombard Governor Corp.
100 Maine St., Ashland, Mass.



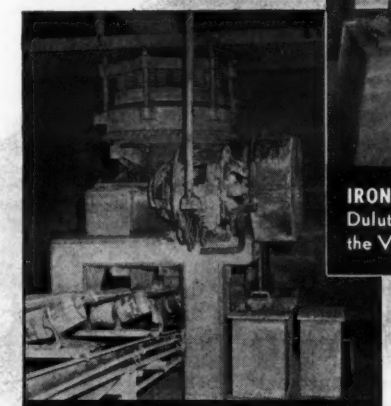
QUARRY PLANT—Arundel Corp., Baltimore, Md., operates six Gyrasphere Crushers of all sizes.



IRON MINE—Snyder Mining Co., Duluth, uses 48" Gyrasphere in the Virginia Mine, Eveleth, Minn.



GRAVEL PLANT—Boston Sand & Gravel Co., Cambridge, Mass., operates this 36" Gyrasphere.



CEMENT MILL — Diamond Portland Cement Co., Middle Branch, Ohio, uses a 24" Gyrasphere.

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IMPROVED PRODUCT
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C. & E. M. Photo
E. M. Jackson, Commissioner of Precinct 2 of San Patricio County, Texas, stops for the camera in front of his warehouse and storage yard.

Roads Stabilized In Loamy Area

Caliche, Oyster Shells, Or Asphalt Used by South Texas County in Low-Cost Road Work

✦ THE heart of America's winter garden is a horticulturist's delight and a road builder's nightmare. Organic matter, friability, and the presence of plenty of moisture in this soil constitute a fairly certain guarantee of crops in abundance. But these properties also make it safe to bet that you can't build a road strong enough to haul the heavy vegetable loads to market.

Down in the southern part of Texas in San Patricio County, where many of America's winter vegetables are raised, the men who build and maintain the county roads rest uneasily in their beds at night. They are troubled with the thought that "San Pat's" soils are something over 5,000 feet deep before you hit rock. Neither does it help their peace of mind to know that 60 inches of rainfall, sometimes in 8-inch downpours at a time, drench the land each season. Or that the county has only a 50-foot elevation differential from one end to the other, and that in some places it is perfectly flat. San Patricio County is the place where Texas engineers put on hip boots when they work up hydraulic-flow formulas.

Despite these two extremely troublesome problems, subgrade and drainage, the County has worked out a system of successfully building about 720 miles of roads. All of them are serviceable except in the wettest weather, and some of them might well be copied in any section of the nation beset by the same conditions. The answer comes in two parts: (1) hard-surfaced roads, and (2) soil stabilization.

The southern side of San Patricio County borders on the Gulf of Mexico, where the land lies flat and level for miles, practically at sea level. It finally rises slowly towards the northwest corner near Mathis, where one of the stabilization materials can be found in abundance. The other material, crude oil, is pumped up out of the ground of San Patricio County. One of its products — asphalt — is also occasionally used.

The County has to maintain roads and bridges, keep its equipment in repair, and pay the salaries of its road-department workers on an annual budget of $150,000. In spite of this monetary limitation, it has built 125 miles of permanent hard-surfaced roads, all of which are in an excellent state of repair.

Drainage

The first and biggest problem is drainage. Where roads are constructed on embankments above the level of surrounding country, an abnormal number of flow structures must be built. These allow water to move with the grade of the land without damming up along a highway fill. This county was for years a heavy cotton-raising section, and one of the serious troubles it experienced was what Texans call a "floating rain". It seems that rain fairly falls in bucketfuls, covering the land with water in a half hour or so. When this happened, dry cotton stalks, which had been cut up by disks, floated to the surface. Wherever they found a drain, a bridge, or a culvert, the result was a sure-fire plug unless the opening was at least 8 feet wide.

San Patricio County, of course, went through that period every other American county has seen: wooden drains, concrete-pipe culverts, corrugated metal-pipe drains, and so forth. It is now replacing most of the wooden drains entirely, either by large-diameter concrete pipe or concrete box culverts. Moreover, it is making certain that as soon as the work on secondary roads gets under way as provided by Federal Aid, this problem will be dealt with fully in all design; that as many wide, shallow culverts will be provided as are reasonably needed.

Embankments which carry county highways above surrounding terrain level are further drained by ditches along each side. The road builders try to figure some kind of grade on each of these ditches, no matter how gentle it is, to get rain water and ground water away. There are actually some places where this is not possible, however. Along these level places they have scooped out reservoirs, which they call "swales". Here the water accumulates during the wettest season, and drains off during the summer. It is not a good remedy, but it seems to be the only feasible low-cost one.

Ditches along the highway shoulders are bladed twice a year, usually in the summertime during a dry spell. This operation accomplishes two things at

(*Continued on next page*)

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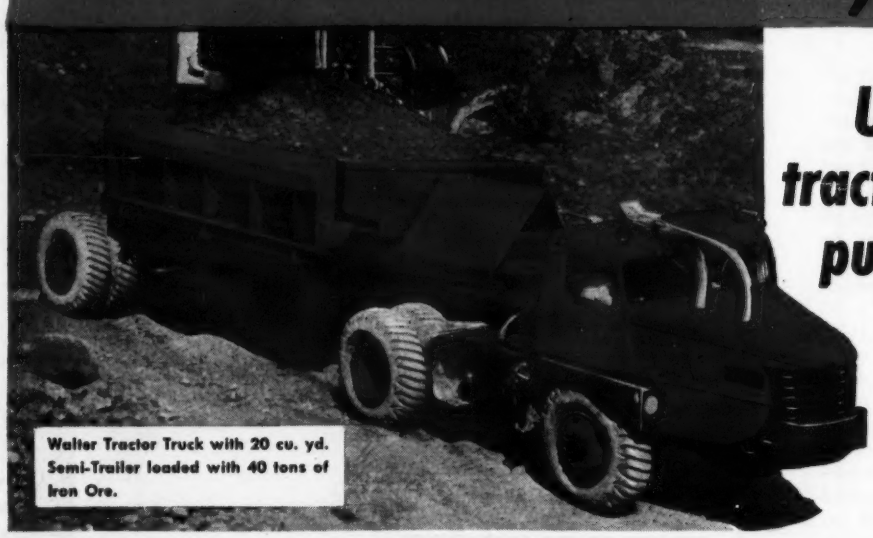
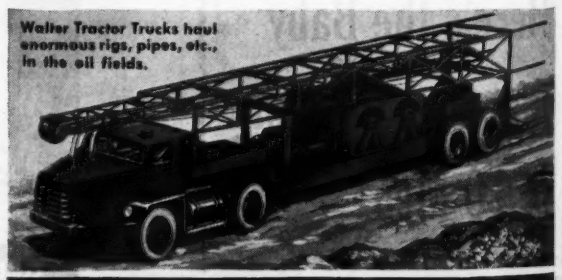
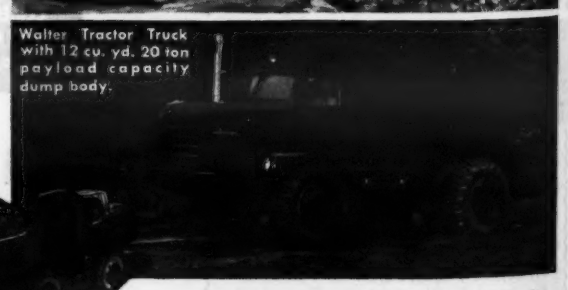
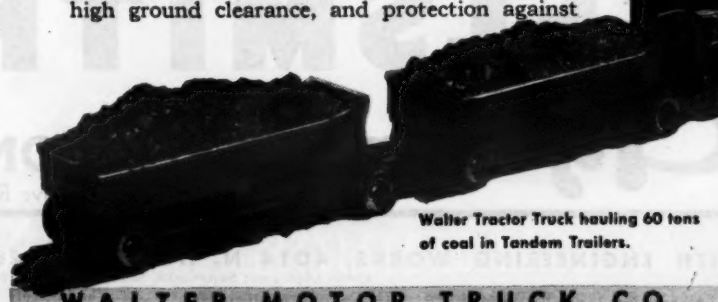

Walter Tractor Truck with 20 cu. yd. Semi-Trailer loaded with 40 tons of Iron Ore.
Unequalled traction and power pull huge loads through toughest terrain

The bigger the loads, the tougher the running, the steeper the grades — the more you need Walter Tractor Trucks. In mining, logging, oil fields, construction . . . wherever tough hauling jobs exist . . . you find Walter Tractor Trucks doing the "impossible." They are hauling payloads ranging up to 60 tons, through broken ground, slippery surfaces, mud and up steep grades — at speeds that make every hauling hour more productive.

Motor power alone cannot accomplish these hauling feats. It takes the unique Walter drive system . . . Four Point Positive Drive . . . to provide the necessary traction to utilize every horsepower. In this drive, three automatic locking differentials proportion the power to each of the FOUR driving wheels according to its traction at any instant. They never send power to slipping wheels, as in conventional 2- and 4-wheel drives. There is never any wheel spinning to bog down loads, gouge roads or grind tires.

Other valuable features include a final drive mounted above — not in — the axle, to provide high ground clearance, and protection against load strains and road shock; tractor type transmission for increased gear capacity; engine-ahead-of-wheels for correct weight distribution and shorter turning radius. Write for detailed literature.


Walter Tractor Trucks haul enormous rigs, pipes, etc., in the oil fields.

Walter Tractor Truck with 12 cu. yd. 20 ton payload capacity dump body.

Walter Tractor Truck hauling 60 tons of coal in Tandem Trailers.
WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD 27, QUEENS, L. I., N. Y.
WALTER TRACTOR TRUCKS

Roads Stabilized

(Continued from preceding page)

once: it shapes the ditch lines anew, and it reduces weed growth.

Caliche Soil Stabilization

Bear in mind that the soil bed is several thousand feet deep, and that the black organic topsoil of this county is from 4 to 6 feet deep over 90 per cent of the land. Then you will have an idea of how desperate is the hunt for some material — any material — which will make a durable road.

At Mathis, in the northwestern corner, the road builders have found the only answer: caliche. Caliche, if properly processed, has a high degree of flexural strength in its own right. In San Patricio County they have found how to process it so it will hold. The secret is water; yes, the same water the engineers damn everlastingly when it creeps in under their subgrades.

Crushed caliche can be purchased at a commercial plant at Mathis for 60 cents per ton, and delivered f.o.b. on a dump truck. Hauls are long and are a great item of expense, for a dump truck hauling 25 miles one way cannot make more than about four or five trips a day. This material is nevertheless hauled almost the year round, within the limit of available funds, to improve existing highways.

It is usually processed in the summer, when the subgrades can be shaped and compacted without ever-present rains. Even so, the fog which rolls in over the land from the Gulf of Mexico leaves a great deal of moisture in the black land. The embankments are shaped and bladed with a crown allowance of about ½ to ¾ inch per foot before applying the caliche. A weighted pneumatic-tire roller is generally also used on the black dirt.

Caliche is bladed out in 2-inch layers by motor graders, after being dumped by the haul trucks. When it is perfectly smooth, water is applied by tank truck until the surface has free water standing upon it. Plenty of it is applied. When this moisture works its way down through the caliche, a pneumatic-tire roller kneads and compresses this rocky, cement-like material into a solid mass. Caliche with a good per cent of fines makes a much stronger road than granular, rocky, coarse particles. The process is repeated until a strong roadbed 4 to 6 inches deep has been constructed. It is absolutely imperative that caliche be spread in thin layers and compacted thoroughly; otherwise only the top surface will receive any degree of density and the water will remain only in that part. Later, when rains fall and ground water seeps in under this weakened pavement, a failure will certainly occur. Caliche makes a permanent, all-weather road, if it is properly laid.

Oyster-Shell Stabilization

Along the Gulf Coast, oyster-shell surfacing has been tried. While the road thus built has been considerably better than the graded dirt road, the result has always left something to be desired. There is not enough binding material either in San Patricio's native soil or in these shells to make a stable surface.

Asphalt Stabilization

About six years ago, before the WPA died, San Patricio County fell heir to two concrete mixers, two dozen wheelbarrows, and a lot more WPA labor than is practical on a construction job. The County was in a position where it had to use these men. So it conducted an interesting road-building experiment.

The mixers, wheelbarrows, WPA labor, and of course a timekeeper and a latrine, were taken outside the town of Odem to a 4½-mile section which led through an oil field. Heavy trucks, tractors, and trailers loaded with oil-field equipment had made a shambles of the old road.

The mixers were set up at one end of this section, on a subgrade which had been bladed and left open to traffic for several weeks. Sand was trucked in from the Gulf beaches, and some clay was brought in from a borrow pit. A mix of equal parts of clay, sand, and native black soil was fed into the mixers by the laborers, with approximately six per cent by volume of 50-50 emulsified asphalt. If it looked all right, fine; if not, a little water was added. The mixed material was dumped out of the two mixers in a windrow in the center of the highway, and allowed to drain 24 hours.

A motor grader then split this win-

(Concluded on next page, Col. 3)

The Tractor is Harnessed... Not Shackled

When an International TracTracTor is equipped with a Bucyrus-Erie DOZER-SHOVEL, all the speed, power and flexibility of the TracTracTor are retained because its original characteristics remain unchanged:

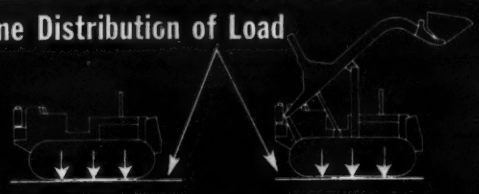
No Radical "Balance Upset"

Almost exactly the same center of gravity as that found on the TracTracTor alone is maintained. The effective traction and stability of the bare tractor are retained. There is no loss of power, no excessive wear, no loss of the efficiency originally built into the tractor.

Free Track Oscillation Retained

With the DOZER-SHOVEL mounted to the TracTracTor, the full free track oscillation of the bare tractor is retained to give you the maximum track-to-ground contact that means so much to tractive effort and to stability.

Same Distribution of Load



The DOZER-SHOVEL is so perfectly matched to the tractor that together they form a combination unit which maintains the same uniform distribution of weight over the ground-contact shoes as that found on the bare TracTracTor. While total weight is, of course, increased, distribution of the extra weight is exactly the same as the distribution of the tractor's weight.

Retention of original tractor characteristics is just one of the many reasons why the versatile DOZER-SHOVEL (for T6, TD6, T9, and TD9 TracTracTors) is UNIQUE among front-end loaders. Let your International TracTracTor Distributor tell you about some of the other reasons, too: three-way service,* full front visibility, low overhead clearance, positive down pressure, simple rugged design, easy interchangeability.

* shovel — bulldozer — crane

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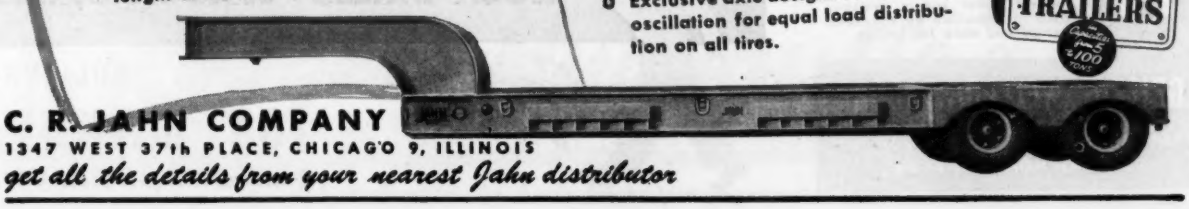
4 Worm gear type slack adjusters at each wheel.

5 Constant lift cam provides improved brake application.

6 Exclusive axle designs furnish ample oscillation for equal load distribution on all tires.

JAHN Heavy Duty TRAILERS



C. R. JAHN COMPANY

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get all the details from your nearest Jahn distributor

The latest addition to the Huber roller line is a 3 to 4-ton tandem.

Baby Tandem Roller Has Variable Weight

Built to meet the need for a small roller in the construction and highway-maintenance field, a variable-weight tandem unit has been announced by the Huber Mfg. Co. The roller weighs about 3 tons, but can be increased to 4 tons with water ballast.

Powered by a 4-cylinder air-cooled V-type gasoline engine, the new Huber has 2.6 and 4.4-mph speeds, forward and reverse. The baby tandem is 124 inches long, 48 inches wide, and 67 inches high. It has an 80-inch wheelbase, and a ground clearance of 10 inches under the frame.

Both the steering roll and the compression roll of the new Huber are equipped with rust-resisting sprinkler pipes, which are gravity-fed from a large water-supply tank. Anti-friction bearings are used at wear-spots throughout the machine.

Specifications and details can be obtained from the Huber Mfg. Co., P. O. Box 501, Marion, Ohio. Say you saw the roller pictured in CONTRACTORS AND ENGINEERS MONTHLY.

Data on Waterproofings

Complete and short specifications and descriptions of its products, as well as illustrations, feature "Book A," just issued by the Truscon Laboratories, manufacturer of waterproofings, damp-proofings, and concrete specialties. Integral and iron waterproofings are covered in one section; clear and bituminous damp-proofings in another; and such items as concrete-curing methods, shrink-proof mortar, paints, etc., in the third.

Contractors and engineers can obtain copies of "Book A" from the Truscon Laboratories, Caniff & Grand Trunk RR, Detroit 11, Mich., on mention of this news report.

Roads Stabilized

(*Continued from preceding page*)

drow, moving half to one shoulder and half to the other. One half was then brought back a little at a time, and laid down in lifts 1½ inches thick. A pneumatic-tire roller thoroughly compacted each layer as it was bladed on. The finished pavement was from 4 to 4½ inches thick.

Now, almost six years later, this road is in excellent condition. It has successfully taken the worst punishment that heavy trucks and oil-field traffic could dish out. When this road was two years old, the oil company donated $7,000 for 1 inch of bituminous armor coat. A section of this pavement, which was cut out in 1946, appeared as dense and heavy as concrete. Out of the depression-induced experiment has come an idea. It may well be that the County has found something.

County Organization

San Patricio County is divided into four sections, with the roads of each section under the jurisdiction of a road commissioner, whose office is elective at 2-year intervals. This four-man group meets with the County Judge to iron out all county-wide problems. He is the senior member, and by all the rules of tradition may cast the deciding vote in case of a tie in any given situation.

County road funds are derived from a 6,000-vehicle-registration kickback, from 1 cent per gallon of the state gasoline tax, and from a 30-cent road-tax levy per $100 assessed valuation on property.

Judge L. C. Ivey is the County Judge; E. H. Lewis is Commissioner of Precinct 1 at Sinton; E. H. Jackson is Commissioner of Precinct 2 at Odem; C. E. Key is Commissioner of Precinct 3 at Mathis; and George R. Clark is Commissioner of Precinct 4, which is the largest one, at Aransas Pass.

These five men, working together, have successfully built roads that last, through the nation's garden.

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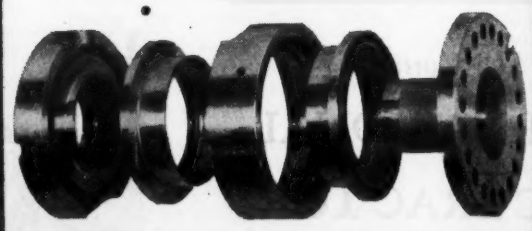

The exclusive Sullivan Dual Valve is a big factor in the outstanding efficiency of Sullivan Drills. It steps up drilling productivity because it makes air do more work. The Dual Valve provides positive air control on both strokes of piston, giving exact, "cushion control."

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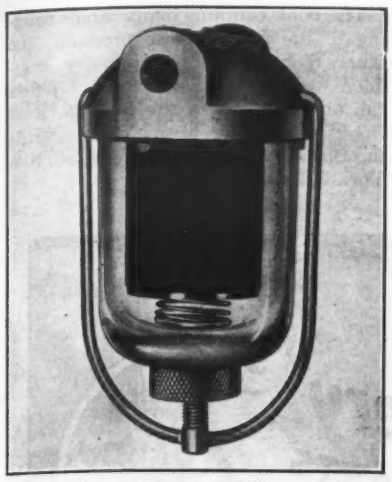


The Skinner oil and gasoline purifier, widely used throughout the war, has now been released for civilian use.

Cylinder of Ribbons Filters Engine Fuel

Another wartime development for use in gasoline and fuel-oil engines, a purifier, has been announced by Skinner Purifiers, Inc. The device is said to improve the performance of engines by purifying fuel even to the point of separating free water from gasoline.

In its civilian form, the Skinner purifier with its Kwick Klean Kartridge is made in one model to fit almost all applications in cars, trucks, tractors, stationary engines, and fuel-oil burners. Ribbons of impenetrable material are built into spiraled layers to form the purifier cylinder. As the fuel passes through these, the dirt and other impurities are said to be stopped at the outer edges of the ribbons. These collected impurities can be cleaned from the unit merely by blowing air through it, Skinner says.

Full details about this fuel purifier can be obtained by mentioning this news item when writing to Skinner Purifiers, Inc., Detroit 11, Mich.

Power Plant Produces 500 Watts, 110 Volts

Although no power line is available, electric tools, floodlights, and other units can be operated on the spot with Model 23HAB4, a power plant made by the Kato Engineering Co. Built for 500-watt capacity, this 110-volt Katolight generator produces 60-cycle current at 1,800 rpm. It is powered by a Briggs & Stratton air-cooled 1-hp single-cylinder engine.

Features of the generator include a push button with cutout, a dc ammeter, charge-control, resistor, and battery cables. The engine has a 1-gallon fuel tank, float-feed carburetor, gravity feed, and a sensitive flyball governor for controlling speed and frequency output. This Katolight plant weighs 125 pounds, and is 25 x 11 x 20 inches in size. Hand-starting facilities are supplied with the unit, or a 6-volt auto-type battery may be used.

Details concerning this and other Katolight power plants can be obtained by addressing the Kato Engineering Co., Mankato, Minn. Mention this news item.

Calculator for Preheat Temperatures in Welding

Because of the low carbon and alloy content of most steels, they are found to be readily weldable, and to require no preheating. However, as the content of carbon and other alloys increases, the danger of cracking the base metal close to the weld also increases. In such cases it is usually found desirable to heat the metal before welding.

To aid welders working on those steels which experience indicates should be preheated, the Lincoln Electric Co. has issued a "Preheat and Interpass Temperature Calculator". Based on the effect of various alloys on the hardness of steel, the calculator guides the welder in establishing a preheat temperature.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can obtain copies of this calculator by writing the Lincoln Electric Co., Cleveland 1, Ohio, and enclosing 25 cents.

New Tractor Described

The new HD-7 diesel tractor, now being distributed by the Allis-Chalmers Tractor Division and its dealer organization, is the subject of a 24-page illustrated catalog just issued by the firm. Prominent display is given the 2-cycle GMC engine, the unit injector, the Positive-Seal truck wheels, and the tractor's transmission construction. Other data and specifications are also shown.

Copies of this catalog, Form MS-290A, can be obtained by writing Tractor Division, Allis-Chalmers Mfg. Co., 1946 Power St., Milwaukee 1, Wis.

Truk-Loder Dumping dirt into hauling truck

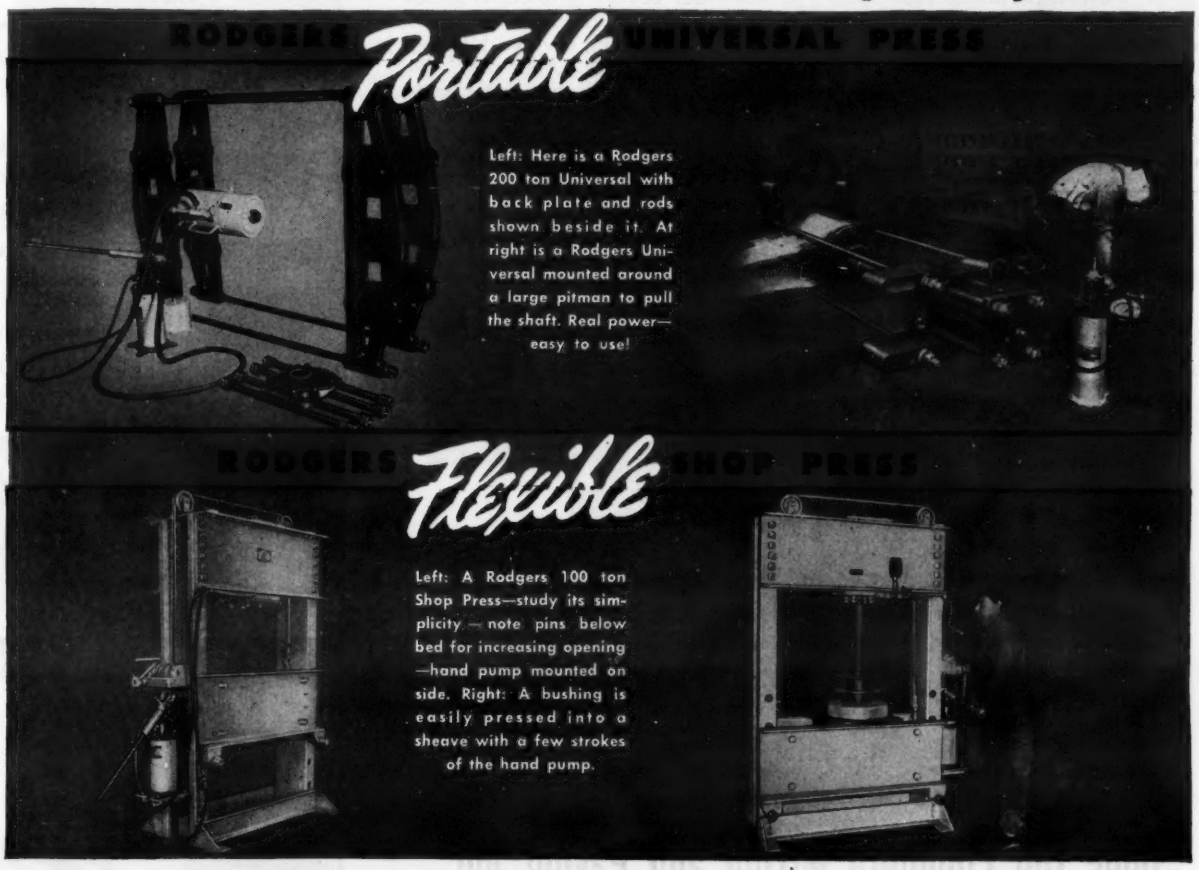
HANDLES LOOSE DIRT QUICKLY

For highway construction and maintenance. Surplus berm and ditch dirt are quickly and economically loaded.

Hauling trucks can be loaded from either side or rear. Standard dump truck hoist furnishes lifting power. One-man operation. Bucket has ½-cu. yd. capacity. Write for prices and delivery.

TRUK-LODER COMPANY • Tiffin, Ohio

2 unusual hydraulic PRESSES that can save you Time, Labor and Trouble on 101 maintenance, service and special jobs.


RODGERS UNIVERSAL PRESS
Portable
Left: Here is a Rodgers 200 ton Universal with back plate and rods shown beside it. At right is a Rodgers Universal mounted around a large pitman to pull the shaft. Real power—easy to use!
RODGERS SHOP PRESS
Flexible
Left: A Rodgers 100 ton Shop Press—study its simplicity — note pins below bed for increasing opening —hand pump mounted on side. Right: A bushing is easily pressed into a sheave with a few strokes of the hand pump.

STOP and think of all the uses you can find for these versatile Rodgers Presses — pulling gears, pinions and wheels; pressing shafts, bushings and pins, squeezing, clamping and jacking operations —wherever you need 50 to 200 tons of easily-applied hydraulic power.

The Rodgers Universal is a unique portable unit for field or shop service. It is used on a stand as an ordinary press, on its side or flat and is easily assembled around equipment for special operations. Rodgers Hydraulic Hand Pump or Power Pump supplies power.

A Rodgers Shop Press is a flexible unit with a bed that is easily raised or lowered to accommodate various size work. Cylinder may be adjusted across entire width of bed. Rodgers Hand Pump or Power Pump furnishes pressure.

If you have equipment to service you can save yourself hours of time and labor with a Rodgers—they often pay for themselves on a tough job or two. Write for *all* the details. It will be profitable.

Send for this new catalog . . .

It will give you complete information on Rodgers Hydraulic Presses. No obligation, of course. Write today.

Rodgers Hydraulic, Inc.

hydraulic power equipment

Shop Presses

Crawler-Track Presses

7415 Walker St., St. Louis Park, Minneapolis 16, Minn.

Power Pump Units

Portable Presses

"Boy — I'd like to meet the gal who had this job while I was overseas—"

Horizontal Blades Mark Lawn Mower

Highway department officials will be interested in a power lawn mower recently demonstrated by its manufacturer, John A. Roebling's Sons Co. New in both design and principle, this 30-inch mower is described as able to cut and trim grass in one combined operation and to cover ½ acre an hour.

The Roebling Rotary power mower has an action similar to that of two electric fans placed side by side and face down over the grass. The high-speed horizontal blades reach to the very edge of obstructions, almost completely eliminating "after-trimming", Roebling explains. The mower is said to cut all grasses or weeds, regardless of height, and to eliminate grass-matting and overlapping runs, since the wheels are behind and well inside the path of the cutting blades.

Delicate balance, easy control, fingertip steering, compact size, and lightness are cited as other characteristics of the new mower. The handle is collapsible and can be folded for winter storage. The four cutting blades are made of heat-treated shatterproof steel, are double-edged for double duty, and can be removed for sharpening or replacement.

Whenever the handle is released, an automatic clutch disengages the wheel drive and the blades from the idling motor. The motor can be started only when thus disengaged. The cutting height of the blades is adjustable from 1¼ inches to 2½ inches in ¼-inch gradations.

More complete details about this new hand power mower can be obtained by writing John A. Roebling's Sons Co. at Trenton 2, N. J.

Southern Covered Bridge Is Saved by Agreement

Salvation of the 200-foot-long Knox bridge has been agreed to by the Georgia and South Carolina Highway Departments. The old covered wooden landmark across the Tugaloo River near Fair Play had been scheduled for removal, so that a new steel and concrete span could carry Route 59 across at the same site. Protests of neighborhood residents resulted in a change of plans, and the new span will be erected 300 yards south of the present crossing. Built of heart pine, Knox Bridge is one of the few remaining covered highway spans in the country. Approaches for the new bridge will soon enter construction. Its cost will be shared by both states, but its construction will be supervised by the Georgia Department.

Data Book on Road Tar

Information and advice on the use of Tarvia and Tarvia-Lithic for surface treatments, base stabilization, road mixes, penetration macadam, and similar applications, are given in a handy pocket book.

The book contains many tables relating to the use of these products, and other data of value. Highway engineers, contractors, and road builders can obtain copies of the Barrett "Road Book" on mention of this notice. Write the Barrett Division, 40 Rector St., New York 6, N. Y.

LARGE WAREHOUSE STOCKS

insure immediate delivery of wearing parts for contracting and mining machinery. Check the items below and write or wire for prices and delivery dates.

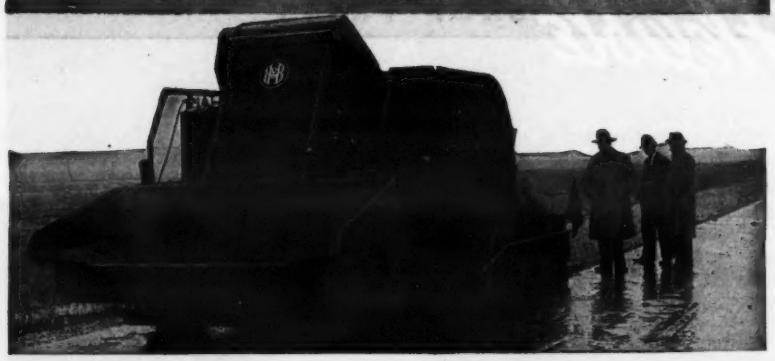
PACIFIC Manganese Steel Renewable Tractor Rims—Crawler Shoes—Crusher Jaws—Check Plates—Mill Liners—Roll Shells—Mill Hammers—and other Wearing Parts.

All are made of exactly the right steel to last longer and bring you lower operating costs. Ask for WEARING PARTS Bulletin.

ALLOY STEEL & METALS CO.

H&B Moto-Paver

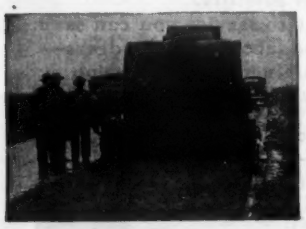
THE COMPLETE TRAVELING MIXER AND PAVER



Does the Complete Mixing and Paving Job

● The Moto-Paver mixes, spreads and lays any type of mixed-in-place bituminous material to any road width, thickness and crown condition. No separate loader, spreader or other paving equipment is required—no trailer to haul the machine from one job to another.

The Moto-Paver does *the complete mixing and paving job,* and travels from one job to another under its own power. Paving speed is from 4 to 50 feet per minute, road speed up to 18 miles per hour. Mixing capacity 100 to 120 tons per hour. Bulletin MP-46, giving complete information and specifications, will be sent on request.



Resurfacing Michigan Road with the Moto-Paver

HETHERINGTON & BERNER INC.
731 KENTUCKY AVE. • INDIANAPOLIS 7, IND.

Also Builders of Portable and Stationary Batch Mix Plants of All Types and Capacities

Hetherington & Berner

"A Cost Buster" On Every Concrete Placing Job

THE Mall VIBRATOR REG. U.S. PAT. OFF.

Savings you can count on with a Mall Concrete Vibrator: (1) Save sand, water and cement by placing a stiffer mix (2) Avoid hand patching by eliminating honeycombs and voids (3) One man places more concrete faster than five hand puddlers (4) Strip forms earlier—release form board for next job (5) Do the job faster—because for its size, a Mall Vibrator places more concrete than any other vibrator (6) Variable speed gasoline engine delivers wide range of vibration frequencies and operates eight other tools.

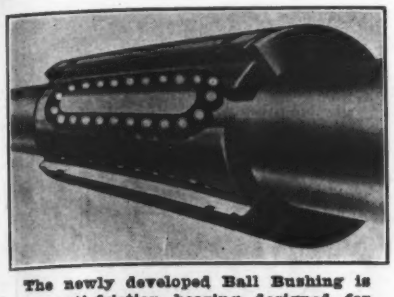
1½ H.P. Gasoline Engine (illustrated) also 3 H.P. Gasoline Engine with round base or wheelbarrow mounting, 1½ H.P. Electric and 7500 r.p.m. Pneumatic units.

Ask your Distributor or write for literature and prices.

MALL TOOL COMPANY, ★ 7743 South Chicago Ave., Chicago 19, Ill.

25 Years of "Better Tools For Better Work"

Mall REG. U.S. PAT. OFF. PORTABLE POWER TOOLS



The newly developed Ball Bushing is an anti-friction bearing designed for linear motions.

Ball-Bushing Bearing For Linear Motions

There are two fundamental mechanical motions, rotary and linear. Until the development of ball bearings, plain sliding bearings were used for both rotary and linear motions. A new development now available is said to contribute to linear motions what ball bearings contribute to rotary motions.

This anti-friction bearing, the Ball Bushing, is offered by Thomson Industries, Inc., as a solution to two problems inherent in plain, sliding, linear bearings. It is said to reduce the deterioration which is due to oxidation of the oil film over the exposed surface of the shaft upon which the plain bearing's operation depends. The manufacturer also says that it reduces the length-to-diameter ratio needed by plain linear bearings.

Standard Ball Bushing sizes vary from ¼ to 4-inch shaft. From ¼ to 1 inch, the variation is in ⅛-inch steps; from 1 to 3 inches, it is in ¼-inch jumps; and from 3 to 4 inches, in ½-inch gradations.

Production of these anti-friction bearings is now under way, Thomson says. They will also be developed for use on square shafts. For further details and a booklet that contains engineering information, write the firm at 29-11 Review Ave., Long Island City 1, N. Y.

Primary Crusher Has High Crushing Speed

Modern design features the Simplex line of single-jaw primary crushers for use in aggregate plants, quarries, and like installations. Produced by the Straub Mfg. Co., the Simplex is built in three sizes, with feed openings of 30 x 15, 36 x 20, and 42 x 25 inches. It is characterized by all-steel construction, a well balanced operation cycle, and small power requirements. An all-welded steel frame helps reduce the unit's weight, while scientific design of moving parts makes for less vibration.

The Simplex is said to crush without rubbing. Its swing jaw hangs freely from a large hinge pin, which is set on the axis of the crushing zone. The jaw's motion nips the rock and crushes it squarely, with a minimum of slippage and therefore a reduction of wear on the jaw plates.

Simple mechanical construction, in which bearing pressures are reduced to a minimum, features the entire crusher. The unit can be choke-fed, and will maintain speeds from 300 to 400 strokes per minute. Because of the balanced operation of the various parts, only a little power is needed to operate the Simplex in comparison with older machines, Straub says.

On a field installation of the new crusher, an ordinary 20-hp motor used with seven belts met demands ranging from 8 to 24-hp. It did so although run-of-quarry andesite was choke-fed to the machine and crushed to 3½ inches at the rate of 75 tons per hour, Straub reports. The largest Simplex uses 30 to 60 hp; the smallest, 15 to 30 hp.

The Simplex has a relatively light and small driving pulley. To protect against "tramp iron" or any severe overloading of the machine, this pulley is not fastened to the shaft, but is driven through an overload safety device built into the hub.

Lubrication is furnished through pump and splash systems. The crusher is completely sealed to keep the dust from working parts and keep the lubricating oils within. Definite oil pressures are maintained, and an automatic cutout is provided to protect the machine should the oiling system fail. Straub says that 5 gallons of clean oil pass through the system every minute.

Details of these three Simplex single-jaw crushers, and of other members of the Simplex family, can be obtained from the Straub Mfg. Co. on mention of this notice. Write the firm at 502 Chestnut St., Oakland 7, Calif.

Diesels Have 15-300 Hp

Diesel engines for automotive, industrial, and marine installation are shown in a colorful new 12-page brochure issued by the Buda Co. of Harvey, Ill. The publication illustrates the 161 Series, a complete range of engine sizes from 15 hp in a single-cylinder unit, to 300 hp in a supercharged eight-cylinder model. Most parts for the six models in 161 Series are interchangeable. The class also includes natural-gas, gasoline, and butane engines built along the same design lines as the diesel units. The brochure, Bulletin 1190, can be secured from Buda on mention of this notice.

New Dealers for Davey

Parts and service facilities, and the entire line of Davey air compressors, power take-offs, portable lighting units, power saws, and Mobile Machine Shops, are now being handled by Jenkins & McCloud of Reno, Nev.

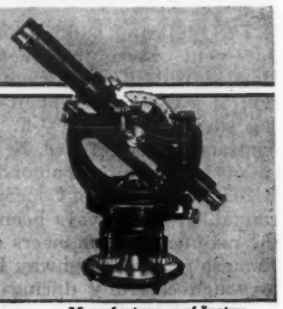
Similar facilities will be available in Texas through Don A. Carpenter & Co., El Paso.

Order Now! MAKE SURE OF EARLY DELIVERY

UNIVERSAL LEVEL-TRANSIT

Latest, improved model. Telescope 12" long, 25 power — Horizontal Circle 4½" with vernier to 5 minutes — Vertical Arc 3".

Instant change-over from Level to Transit. Most practical all-around builders' instrument ever designed. Write for full details.



DAVID WHITE CO. 305 WEST COURT ST. MILWAUKEE 12, WIS. Manufacturers of Instruments for Engineers, Surveyors and Builders.

INSTANTANEOUS FINGER-TIP RESPONSE

with VICKERS HYDRAULIC POWER STEERING

Two fingers on the steering wheel—it turns easily, and the front wheels of the heaviest truck or bus follow exactly. Vickers Hydraulic Power Steering does the work. And steering is just as easy over the roughest ground off the road as it is on smooth concrete. Road shock *cannot* be transmitted from the front wheels to the steering wheel or driver.

Steering is instantly responsive and firm—no rubbery feeling or wander. The driver is relieved of the most exhausting part of his job, enabling him to get more done with less fatigue.

Vickers Hydraulic Power Steering has many other advantages: (1) requires minimum space and is applied to most existing hand steering mechanisms with a few simple alterations; (2) automatic protection against abuse and excessive steering reaction forces; (3) automatic lubrication; (4) 15 years of successful operating experience. Ask for Bulletin 44-30.

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Application Engineering Offices: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA ROCHESTER • ROCKFORD • TULSA • WORCESTER

REPRESENTATIVE APPLICATIONS OF VICKERS HYDRAULIC POWER STEERING

Plant-Mix Surface For Concrete Road

Steep 11 Per Cent Grade Improved Before Winter; A Foot of Black-Top on Each Side for Widening

✦ TWO miles of badly scaled concrete pavement were improved in New Hampshire last autumn with the addition of a two-course plant-mix black-top surface laid by O. F. Winslow, a contractor from Milford, N. H. The location is known as Diamond Hill on U. S. 202, 3 miles west of Concord, the state capital. It had always been a spot for the maintenance engineers of the New Hampshire State Highway Department to watch carefully during the winter because of its long steep 11 per cent grade. The continual use of chlorides during the snow season had kept this heavily traveled Concord-Keene highway clear of packed snow and ice. But it had resulted in much scaling of the 18-foot concrete pavement.

The new bituminous surface covers the scaled concrete slabs. It also extends a foot beyond on each side, increasing the width of the pavement to 20 feet. Work on this $38,025 contract was started on October 8, 1945, and was finished by the end of that month. The original 2-foot shoulders were of tar-treated gravel construction, and when the pavement was widened their width was cut in half.

Construction started with a tack-coat application of asphalt emulsion at the rate of 0.1 gallon to the square yard. For this work the contractor engaged H. H. Maguire of Malden, Mass., who furnished the bitumen and applied it with his own distributor. A near-by gravel road parallel to U. S. 202 made a convenient detour for all except about a 1,000-foot stretch of the hilly location. Consequently the tack coat was applied full width, and two Jaeger bituminous pavers were used to spread the plant-mix full width, on all but the one section where traffic had to be maintained.

Long Haul

The contractor already had an asphalt plant set up at Litchfield, N. H., 30 miles to the south on State Route 3-A; he had previously been engaged there in airport-runway construction. Because of the comparatively small tonnage requirements (4,000 tons) of this 2-mile contract, he decided to make the long haul with the material rather than move his plant to the Diamond Hill location. The plant-mix was transported in nine Mack FN trucks with 5-yard bodies, which were rented by the hour from C. E. Hall & Sons of Somerville, Mass. The trucks carried eight batches from the 1-ton pugmill. As the material was carefully covered with tarpaulins at the plant, the temperature of the mix when it reached the paver was at least 275 degrees F.

The day after the tack coat was applied, the laying of the 1½-inch base course got under way. It was completed full width the length of the job before the 1-inch surface or wearing course was put down. Over most of the work the two pavers advanced almost abreast, one just slightly ahead of the other. In this manner a smooth center-

(*Concluded on next page*)

C. & E. M. Photo

An 8-ton tandem Buffalo-Springfield rolls plant-mix base course at the center joint. Both base and top courses on this New Hampshire surfacing project were laid by Jaeger bituminous pavers.

IT'S SPEEDY
IT'S VERSATILE
IT'S ECONOMICAL

Burch TRUK PATROL can be used the year-round!

Ideal for average road patrol, shoulder maintenance and shallow ditch cleaning. Speedily removes ice and slush in winter months.

Two "feathertouch" Hydromotors control cutting edge and two more control moldboard.

Send for bulletin CE-76

THE BURCH CORPORATION
CRESTLINE, OHIO
Equipment since 1875

IN YOUR PROCUREMENT OF EQUIPMENT

The First Step Is The Plan

IN THIS DAY OF SHORTAGES AND DELIVERY DISAPPOINTMENTS, PROCUREMENT OF EQUIPMENT DEMANDS THE MOST INTELLIGENT APPROACH . . . THE UTMOST COORDINATION OF EFFORT AND A COMPLETE UNDERSTANDING OF THE DETAILED SPECIFICATIONS INVOLVED.

IN OTHER WORDS,—THE FIRST STEP IS A CAREFULLY ENGINEERED DESIGN, — FITTED TO LOCATION AND PRODUCTION REQUIREMENTS.

Engineered BUTLER Design

LIKE ALL MANUFACTURERS TODAY, THE PRODUCTION FACILITIES OF THE BUTLER BIN COMPANY ARE UNDER A TREMENDOUS OVERLOAD. BUTLER ENGINEERS, HOWEVER, ARE READY TO LEND YOU THEIR FULL COOPERATION IN DEVELOPING THAT FIRST ESSENTIAL STEP, — THE PLAN . . . WHILE IT IS UNFORTUNATE THAT SITUATIONS OF UNPRECEDENTED COMPLEXITY MUST TAX THE PATIENCE OF THE BUYER, NEVERTHELESS, BUTLER URGES YOU NOW TO PREPARE YOUR EQUIPMENT PLANS IN COMPLETE DETAIL AND TO PLACE YOUR ORDER SO THAT YOU WILL HAVE THE ADVANTAGE OF DELIVERY WITHOUT ADDITIONAL DELAY WHEN PRODUCTION SCHEDULES PERMIT.

SO BE SURE TO CONSULT WITH BUTLER ENGINEERS, — AND TAKE FULL ADVANTAGE OF BUTLER ENGINEERED DESIGN.

BUTLER BIN CO.
WAUKESHA, WISCONSIN

Plant Mix

(Continued from preceding page)

line joint was practically assured. A Buffalo-Springfield 8-ton tandem roller followed directly behind the pavers and rolled the center line first.

Experiment to Prevent Cracks

An interesting experiment was conducted on this contract in an endeavor to eliminate the later appearance of cracks in the bituminous-concrete pavement directly over the expansion joints between the concrete slabs. On similar work in the past, where old concrete had been covered with black-top, there was noticed a tendency for thin cracks to show up in the new surface. They apparently resulted from uneven settlement of the material over the old expansion joints. To overcome this situation, strips of tin, 9 feet long x 5 inches wide x ⅛ inch thick, were laid over the joints on one side of the road before the placing of the base course. These strips were held in place by nails driven through the thin tin strip into the mastic joint at intervals of 1 foot. Only on one side of the road were these strips laid over the transverse joints; they were omitted on the other side so that the results could be judged later.

Laying the Pavement

With the paver hoppers set at a 10-foot width, the black-top material was spread over the full 18-foot concrete road and for an additional foot on each side. The tar-treated gravel shoulder made an excellent base course for the widening. During the laying of the top or wearing course, the gate on the shoulder side of the paver was left open. From this, additional material was raked out over the remaining foot of shoulder, tapering off to a feather edge at the ditch line. Thus the shoulder was further stabilized, and with careful finishing the slope of the shoulder was established to insure rapid run-off and good drainage.

As October is a cool month in New Hampshire, precautions were taken so that the plant-mix would not cool off too rapidly before it was spread on the road and rolled. Only enough material to lay about 25 linear feet of pavement was dumped at a time from the truck into the paver hopper. When this was used, the tarpaulin was lifted from the truck and more material was unloaded to the paver. By keeping the material under cover in the trucks as long as possible before using, the initial heat was retained to a considerable degree.

In an average 9-hour day about 1,000 feet of full-width pavement, either base or wearing course, was laid. More material, of course, went into the base layer. But since greater care had to be exercised with the wearing surface to get a smooth finish, both courses took roughly the same amount of time. About a ton of plant-mix was required for every 24 square yards of the two-course 1½-inch compacted pavement.

A single paving crew consisted of the paver operator and two men on each side of the paver to regulate the feed gates and to carry material back on shovels, when necessary, to the two rakers who were responsible for the appearance of the surface before it was rolled. When the two pavers were in use this crew had to be doubled, but only one roller with operator was necessary.

Two flagmen were also needed to maintain traffic. Despite the long steep 11 per cent grade, the work proceeded in the same normal manner as it would had the ground been flat.

The Mix

Sand for the plant-mix came from a pit owned by the contractor close to his asphalt plant in Litchfield. The stone was purchased from the Manchester Sand & Gravel Co., only 12 miles away in Manchester, N. H. A total of 4,000 tons of plant-mix was required for the 2-mile job; 2,400 tons went into the base course, and the remaining 1,600 tons were laid as the top or wearing course. The gradation of the material was:

Sieve Size	Per Cent Passing Binder Course	Per Cent Passing Wearing Course
¾-inch	100	....
½-inch	85.5	100
No. 4	37.0	50.0
No. 10	34.5	44.5
No. 20	31.0	40.0
No. 40	20.5	26.5
No. 80	....	7.5
No. 200	....	3.0

This gradation was for a typical batch with everything from the No. 4 sieve down classified as sand, and the stone coming in only two sizes, the ¾ and ½-inch. The batch weights for a 1-ton mix were as follows:

Material	Binder Course	Wearing Course
Sand	660 lbs.	800 lbs.
Stone	1,250 lbs.	1,040 lbs.
Mineral filler	.....	40 lbs.
Asphalt cement (pen. 85-100)	90 lbs.	120 lbs.
Total	2,000 lbs.	2,000 lbs.

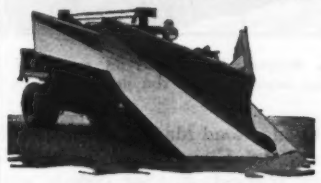
On this 2-mile contract, which included black-top surfacing and widening, E. W. Silliker was Superintendent for O. F. Winslow, the contractor, while John Christianson was Resident Engineer for the New Hampshire State Highway Department. The Department is headed by Frederic E. Everett, Commissioner, with D. H. Dickinson as Chief Engineer and John O. Morton as Construction Engineer.

Canvas and Tarpaulins

Tarpaulin and canvas for contracting uses, outdoor storage, and trucking are manufactured by the Hoosier Tarpaulin & Canvas Goods Co., 1302 W. Washington St., Indianapolis 6, Ind. The firm also makes a variety of tents, some suitable for field shelters. Literature describing these and other canvas products can be obtained on request.

It's TIME to CHECK and DOUBLE CHECK

DAVENPORT-FRINK SNO-PLOWS



ALL TYPES AND SIZES

—are in great demand. The increasing favor accorded to the FASTER ● SAFER ● CLEANER snow removal by these engineer-preferred Sno-Plows makes it good sense to check over your snow removal equipment NOW in preparation for next winter. A complete line. Write TODAY for Complete Information.

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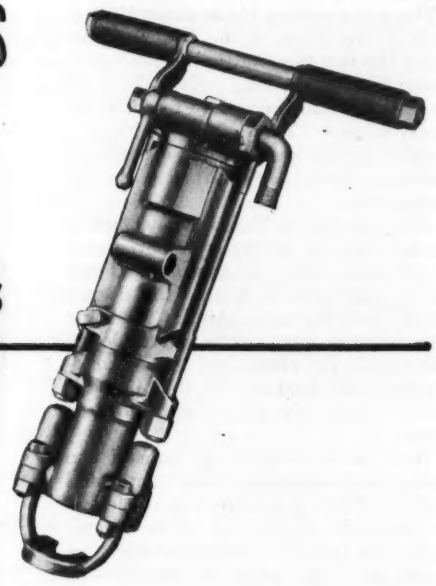
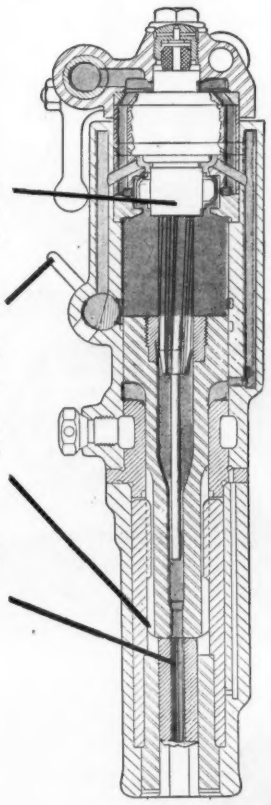
1000 Islands, CLAYTON, NEW YORK

WHY LEADING CONTRACTORS SPECIFY

Thor ROCK DRILLS



DETAIL DRAWING SHOWS Thor SINKER ROCK DRILL IN "BLOWING" ACTION


"Live" air at full compressor pressure goes straight through tool.
Exhaust valve handle at "up" position exhausts air from front of piston.
Piston forced against shank of steel.
Full line pressure diverted through steel for hole cleaning.

The FOREMAN knows Thor's "Straight-line" design provides extra blowing power to keep the hole clean and speed drilling

Exceptional Hole Cleaning ability is a major reason why Thor Sinker Rock Drills perform at peak efficiency to give more footage per shift. "Straight-line" design, as shown at the left, puts compressed air at *full pressure* directly through the center of the steel to the drilling face. This heavy blast—controlled by the drill runner—blows the hole clean and adds to the penetration rate. This efficient blowing prevents "stuck steels."

This same efficient use of air power, automatically controlled through Thor's short-travel, tubular valve, provides powerful rotation and harder piston-hammer blows that result in superior drilling speed. Prove this yourself on your own work. Your nearby Thor distributor will be glad to arrange a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 West Jackson Boulevard, Chicago 6, Illinois
Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

C. & E. M. Photo
The Euclid loader in action on a grading job in Virginia. Mounted on crawlers and towed by a tractor, the unit has a peak loading capacity of 1 ton per second.

Loader Has One-Ton Per-Second Capacity

The Model BV loader, made by the Euclid Road Machinery Co., is designed to work with large-capacity hauling units. Its features are said to be speed and mobility of loading.

There is a cutting blade about 9½ feet wide at the front of the loader. This starts the dirt moving up the conveyor, which is 32 feet long. Its belt is 54 inches wide and is powered by a 150-hp diesel engine. These features help to account for the peak loading capacity of this belt, which is at the rate of one ton per second.

Also relevant to the loader's speed is the fact that its conveyor is constructed at an angle. For this reason, material can be dug directly behind the tractor which tows the unit. And at the same time, hauling units can be driven alongside under the chute and loaded. Excavating and loading can thus both be done while all the equipment is on the move.

The tractor operator by himself can control and coordinate both tractor and loader. Three hydraulic control levers are mounted on the rear of the tractor within his reach for control of the conveyor belt, the angle of the cutting blade, and the depth of the cut.

The 46-foot-long loader is said to be versatile, as well as speedy and mobile. It can be operated in narrow cuts because of its diagonally mounted conveyor and its own width of 17½ feet, the manufacturer points out. It will grade slopes and ditches, and it will load soft sand and muck because of its own supporting crawler tracks.

The Euclid Road Machinery Co., 1375 Chardon Road, Cleveland 17, Ohio, will send, on request, further details and specifications of this dirt loader. Ask for Form BV-400R when you write, and mention CONTRACTORS AND ENGINEERS MONTHLY.

Mineral Preservative Waterproofs Masonry

Developed more than 40 years ago and first used for preserving archeological specimens, a waterproof compound, Hydrozo, is now being marketed nationally by the National Hydrozo Co. It is said to have a 99 to 100 per cent waterproofing efficiency.

Hydrozo is described as a mineral preservative that is not affected after application by atmospheric conditions. It is brushed or sprayed on concrete, brick, tile, stone, stucco, wood, and other surfaces to waterproof them and make them free from dampness, seepage, deterioration, alkali, efflorescence, or acid, the producer states.

The entire surface being treated is saturated with two coats, applied not less than 24 hours apart. A gallon covers from 100 to 200 square feet or more of surface with two coats, depending on the porousness of the material being treated. The application is colorless and has the consistency of turpentine. Hydrozo can be used with a Lithozinc paste and paste colors to form a waterproof masonry paint.

Details on this waterproofing agent can be obtained by writing the National Hydrozo Co., 5234 St. Clair Ave., Cleveland 3, Ohio. Mention CONTRACTORS AND ENGINEERS MONTHLY.

New LaPlant-Choate Branch Established on West Coast

Sales, service, and parts headquarters for western U.S. and Canada, Alaska, and Hawaii has been established at Oakland, Calif., by the LaPlant-Choate Mfg. Co. of Cedar Rapids, Iowa. The new factory branch replaces the company's former facilities at San Leandro. S. I. Harris, Western Division Sales Manager, will be in charge.

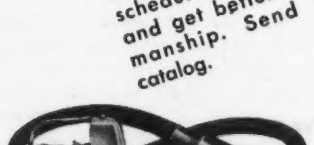
The firm's new western location will permit air-express service to customers from Oakland Airport. A complete stock of machines and parts is to be carried on the new premises at 1022 77th Ave., Oakland.

HIGH SPEED VIBER-ATION

All types of concrete construction are improved by high speed Viber-ation.

VIBER Concrete Vibrators

Give you unmatched speed of 9,500 RPM, in concrete. Keep ahead of schedule with VIBERS, and get better workmanship. Send for catalog.



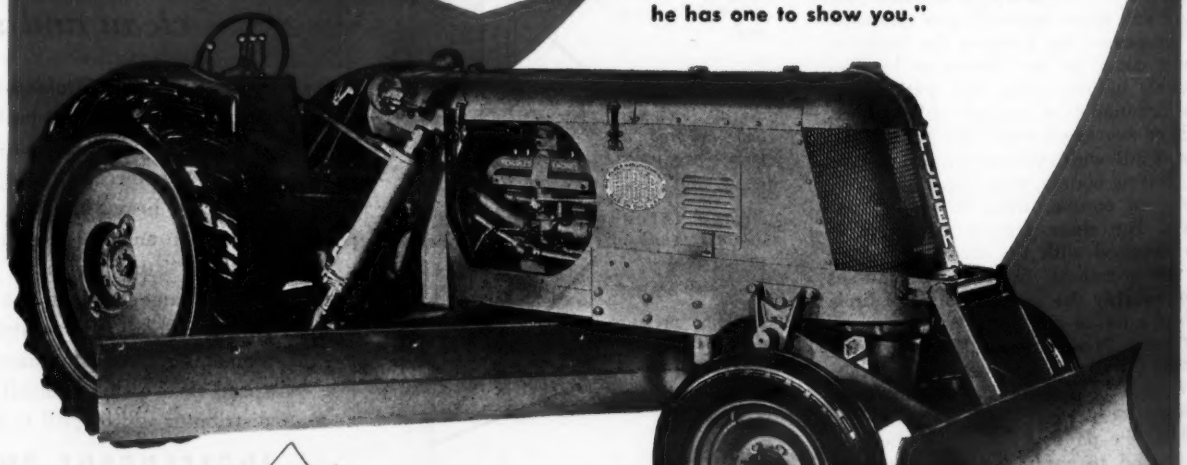
VIBER COMPANY SINCE 1931 726 SO FLOWER STREET BURBANK, CALIFORNIA

ORIGINATORS OF INTERNAL CONCRETE VIBRATION

I Never Would Have Believed it!

"No, sir! I never would have believed it—but there it was—8 machines in one—ready to go into action at a moment's notice as a mower, or load-lifter, or bulldozer, or scraper, or V-type or one-way snowplow, or rotary broom. I am referring, of course, to that dependable, versatile piece of machinery, the HUBER MAINTAINER, with its many outstanding and important features that does all of these important maintenance jobs for one investment. Tell your local HUBER distributor to call you as soon as he has one to show you."

The HUBER Maintainer



Don't think of buying anything else but a HUBER MAINTAINER — that one-man maintenance crew that gets things done in a hurry—and at less cost.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER MAINTAINER

ALSO 3 WHEEL AND TANDEM ROLLERS

Highway Shop

(*Continued from page* 1)

red-brick building with a slate roof. Behind this structure is a 117 x 48-foot shop-garage, while at the rear of the plot is a storage shed, 160 x 40 feet. Like the office, both maintenance buildings are faced with red brick and have slate roofs. On the inside the construction is of cinder blocks with concrete floor. The shop has steel roof trusses while the storage shed has wooden trusses. Both these buildings open onto a large bituminous-paved area with a flagpole and weather vane centered in a 104-foot-diameter circular grass plot at one end. North of the grass plot is a parking field for 100 cars. Wide bituminous drives offer access to both the adjoining highways. The grounds around the buildings are covered with grass and landscaped with trees and shrubbery. A bicycle rack is provided for those who pedal to work from beyond the village.

Prior to 1940 the State occupied rented quarters. Although this plant was built six years ago, and is still the newest of the ten district highway shops in New York, already it is too small for the volume of work it must handle. Plans have been drawn to add a fourth building opposite the shop and of similar dimensions, with shop facilities on the ground floor and a drafting room on the second story. Its completion will form a quadrangle around the yard.

Shop Office

Just outside the entrance to the office, on the east side of the shop-garage, is a gas pump where equipment is fueled. Within the 8 x 16-foot office is the headquarters of Superintendent Jack Herzy, where records are on file with a complete history of every piece of motor-driven equipment. The shop not only services highway equipment in District 10, comprising Nassau and Suffolk Counties and Greater New York, but also maintains passenger cars of other state departments which have offices in New York City. Ordinarily the latter are serviced by commercial garages. But because it has been practically impossible to get mechanics to work on them since the war, this district shop has been delegated for the work. Thus the extent of the shop's operations may bring calls to its mechanics for repairs at such widely removed locations as Staten Island, 50 miles by car and ferry, on the western fringe of its territory, or Montauk, 90 miles away at the eastern end of Long Island.

In the metal files of the office is an 8 x 11-inch folder for each piece of equipment. The folder number is prefixed with 10 to denote the district: 10-1, 10-2, etc. In each individual folder is an "Equipment Descriptive Information Sheet" which contains the following data: kind of machine; district number; date received; make; model; size; serial number; date purchased; manufacturing year; make of motor, model, serial number; number of cylinders; bore; stroke; air cleaner; oil filter; carburetor, type; gas filter; magneto, type, serial number; magneto impulse coupling; starter; generator; make of battery; manufactured by.

To this folder is added each year another sheet containing a complete record of all repairs or improvements which have been made to the unit in that period, even to such items as a spark-plug replacement. This history contains the date, mileage; and a short description of the work done.

A careful record of tires is kept by using a special form for each tire received at the shop. This information includes the tire number, make, type, tread, size, ply, date received, and date returned. It also includes information on its use, such as the dates when it was put on and taken off each wheel, on and off speedometer readings, mileage, and reason for removal. A book containing these forms is kept in the equipment folder. Tires are sent to the district shops from a central state pool, which keeps a record of all tires so they can be shifted about to meet the requirements of the various state departments. The shortage of tires, which was serious through the war period, is now being relieved as shipments are gradually arriving.

The office files also contain a master list of equipment where the following information on every motor-driven unit is entered: number, kind of machine, name of manufacturer, size or capacity, serial number, motor number, model of motor, number of cylinders, bore and stroke of cylinders, date purchased or secured, remarks. This information, all in one place, is helpful when parts are ordered for replacement. In another steel file are manufacturers' catalogs for every unit—also an essential source of information when parts are ordered.

Equipment Maintained

A total 124 units of motor-driven equipment are maintained by this shop, including 63 pieces of road machinery, 31 trucks, and 30 passenger cars. The trucks include:

22	Ford 1½-ton
3	Chevrolet 1½-ton
2	Brockway 3-ton
2	Dodge 3-ton
1	International 3-ton
1	Autocar 3-ton

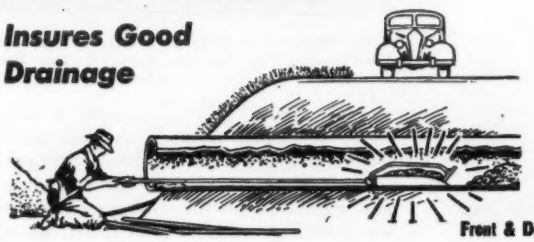
The light 1½-ton trucks have all been driven over 200,000 miles since their purchase in 1935. Ordinarily these would long since have been replaced, but the war has forced the District to maintain these 11-year-old vehicles in working condition. Obtaining parts for all equipment has been a major problem.

The road equipment includes the following:

(*Continued on next page*)

MORCO CULVERT CLEANER

Insures Good Drainage



Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating "Morco" is the most satisfactory tool yet developed for this work.

MONARCH ROAD MACHINERY COMPANY

Front & Douglas N. W., Grand Rapids 4, Michigan

CLEVELAND CLAY AND TRENCH DIGGERS

Take it Out in a Hurry!

★ For loosening up hard ground or tough clay, these tools are real time and money savers. There are four types to choose from—a good digger for every condition. Model CD8 is recommended for average work, for caisson jobs, wall trimming, and similar digging. The TD8, with the extension handle, is just right when the operator has a chance to stand erect in his work. C10D, with the spade handle, and the C10E long-handle digger, are for the tougher job.

Cleveland No. 5 Back Fill Tamper weighs 30 lbs. with butt.

CLEVELAND BACKFILL TAMPERS

Ram all the Dirt Back Firmly!

★ Whenever construction work or paving must proceed immediately after back-filling, Cleveland Tampers will prove to be the answer to your problem. They ram the earth even firmer than it was originally, making it safe for your job to go ahead. And you won't have any dirt to haul away!

Bulletin 128 provides full information on the Cleveland Line of Diggers and Tampers. Promptly sent on request.

Other Cleveland Rock Drill products for contracting include paving breakers, sheeting drivers, sinkers, wagon drills, air line accessories, etc.

Branch Offices and Distributors in Principal Cities and Mining Centers

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Industrial Machinery Co., Ltd., 163 N. Water St., Halifax, Nova Scotia

CLEVELAND ROCK DRILL DIVISION

THE CLEVELAND PNEUMATIC TOOL COMPANY

3781 EAST 77th STREET • CLEVELAND 5, OHIO

Highway Shop

(Continued from preceding page)

1 Buffalo-Springfield 7-ton 3-wheel roller
1 Acme 5-ton tandem roller
1 Austin-Western 10-ton 3-wheel roller
1 Galion 6 to 8-ton tandem roller
1 Galion 3½-ton tandem roller

2 Rome graders
2 Warco graders
1 Galion grader

1 Farquhar 49-foot conveyor

1 Ingersoll-Rand 125-cfm compressor
1 Metalweld-Worthington 110-cfm compressor
1 Worthington 105-cfm compressor
2 Worthington 60-cfm compressors

1 Jaeger ¼-cubic-yard mixer
1 Brewer 10-cubic-foot mixer
3 Ransome 10-S mixers
3 Wonder 5-cubic-foot mixers

3 De Vilbiss traffic-striping machines
1 Lewis traffic-striping machine
2 General traffic-striping machines

1 Domestic 4-inch trench pump
1 Domestic 11-inch trench pump

2 McCormick-Deering tractor mowers
8 Centaur tractor mowers

2 Jaeger 2-inch gasoline-engine centrifugal pumps
8 Gorman-Rupp 2-inch gasoline-engine centrifugal pumps
2 Barnes 4-inch gasoline-engine centrifugal pumps

1 Hough rotary sweeper
1 Friend 500-gallon tree sprayer
2 Acker core drills
1 Mall 48-inch chain saw
1 Adnun Black Top Paver
1 Athey Force-Feed Loader
2 Koehring Mud-Jacks

Other important records in the files are oil sheets which indicate every quart of oil that enters the shop and where it is used.

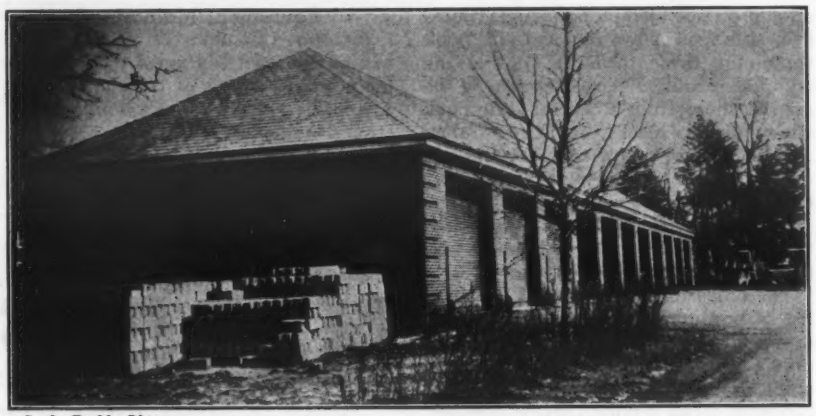
Trouble Shooting

Once a month every truck in the district is inspected. A mechanic, carrying small tools in a pick-up truck, travels through the district checking equipment and making minor adjustments when necessary. When major repairs are deemed necessary, he lists what work is to be done and that truck is brought in to the shop. This inspection, taking about three days, saves many a possible serious breakdown involving a loss of time and money.

By thus averting trouble before it happens, the trucks can also be driven in to the shop under their own power from wherever in the district they may be working. Heavier slow-moving equipment, such as a roller, is transported when necessary on a 10-ton flat-bed trailer.

Garage

Equipment to be repaired enters the garage from the east side through one of three doors, 12 feet wide x 11 feet high, equipped with hand-operated rolling overhead metal doors. There are two other similar doors on the same side which serve the north section of the building which is occupied by a separate department for maintaining traffic-signal lights.



C. & E. M. Photo
The District 10 shop of the New York Department of Public Works consists of three buildings, the headquarters of the District Engineer, the shop-garage, and the storage shed. The last is shown above.

The garage section is 52 x 48 feet, well lighted with three double windows in the west wall running the height of the building to the break at the roof. In addition, twelve overhead lights with 300-watt bulbs furnish artificial light when needed. A central oil-burning boiler in the district office building supplies steam through a tunnel to four radiators with blowers, which distribute hot air throughout the large room. While all doors leading from the garage to other parts of the building are metal, further protection against fire is provided by Buffalo foam fire extinguishers hung on the wall.

When equipment enters the garage, parts are cleaned in two wash basins. These were made by cutting an oil drum in half lengthwise, welding four metal legs to each half, and placing a flat perforated plate at the bottom of the drum so that the cleansing solution can drain off. Solutions of gasoline and kerosene or Oakite are used in cleaning. A high-pressure steam cleaner is expected to be added to the garage equipment when this item is again available.

Scattered throughout the entire building, usually located in the corners, are receptacles for waste or refuse. These 24-inch-diameter metal containers are only 20 inches high; they were purposely made low to prevent overloading and to facilitate collection and dumping. With handles on each side these shallow containers are easily and quickly handled by one man.

Running the 52-foot center length of the room on a steel girder is a Wright 3-ton hoist which is employed for heavy lifting. Another lifting device is a Weaver 3-ton floor crane. It is used chiefly for hoisting front or rear ends of equipment for such repairs as spring replacement.

Engine work is done on a stand consisting of a low wooden 6½ x 3-foot platform on four rollers. At its center is a 4-inch-diameter cylinder 30 inches high, at the top of which the engine to be repaired is bolted. A swivel clamp permits the engine to be turned in any direction by the mechanic. A small 4-wheel cart is used for moving engines around the shop.

Across the rear or west side of the garage is a work bench, well lighted from the windows directly above it and also by five low-hung lights in addition to the regular lighting system. Because sheet metal was unobtainable, plywood was used to cover the wooden bench, which has drawers beneath and lockers above where the mechanics keep their

(Continued on next page)

Brownhoist Buckets for faster material handling

The deep-digging, hungry mouths of Brownhoist Clamshell buckets speed up the handling of coal, ore, gravel, dirt, cinders, clay, etc. Large sheaves reduce rope wear and maintenance. Sturdy construction and latest design insures long life. Available in rope-reeve, power-wheel and link type. Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.

Your Assurance of Maximum Performance... FOR YEARS ...Dependable... Economical and Requiring Minimum Servicing...

Because the purchase of a gasoline powered appliance, farm machine or piece of industrial equipment is a major investment, users, dealers and manufacturers expect years of dependable service. The gasoline engine is the heart — the power unit. If it fails, the equipment fails. Hasty purchases now, with little-known, unproved power units, bring up an element of risk.

To be sure of all that is best and most reliable, insist on Briggs & Stratton 4-cycle *air-cooled* engines. Every possible effort is being made to supply today's unprecedented demands... the wait won't be too long. Remember—"it's powered *right* when it's powered by Briggs & Stratton" — preferred power the world over.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES *Air-Cooled Power*

Highway Shop

(*Continued from preceding page*)

personal tools. On the bench two 5-inch vises are mounted, also a Cincinnati grinder and buffer. Frequent electric outlets are placed not only above the bench but also around the walls on the side.

Garage Equipment

Just inside the first large entrance door, in the southeast corner of the garage, is a commutator set for testing and checking condensers, coils, and other electrical equipment. This is a portable unit and is covered when not in use.

Three small rooms are off the south side of the garage. One of these contains a Worthington 110-cfm compressor which has air outlets along the walls of both the garage and machine shop. Here are also stocked lock washers and cap screws for ready use in the garage. In the second room drums of oil are stored. The third room, which is well ventilated by a blower attachment for drawing off fumes through a wall aperture, is devoted to welding and blacksmith work. Two windows furnish light for these operations which are carried on with a G-E 375-amp electric arc welder, a 27 x 40-inch Buffalo forge, and a 200-pound anvil. A 30 x 48-inch welding table with a ¼-inch metal top rounds out the equipment of this room. Along the south wall of the garage is a Fairbanks beam scale for weighing material both received and sent out. Here also is an oxy-acetylene welding set.

Off the north wall of the garage is a clean well-kept room with lockers, lavatory, and showers. Along this wall is a work sink; an oil rack with facilities for storing in a vertical row four pans of drained crankcase oil; and a Bear wheel aligner. The north door of the three-door garage entrance leads onto a greasing pit. This is illuminated along the sides with gas-fume-proof lights, while the lead-light connections have similar safety features. Greasing is done with a U. S. high-pressure system.

Machine Shop

The machine shop extends the depth of the building at the south end, occupying an area 48 x 15 feet with windows on three sides. Entrance is gained through a 7-foot-wide door at the northeast corner from a passageway connecting with the garage proper. The concrete floor of this single-story room is painted battleship gray. The color makes it easy to keep clean, and the shallow refuse cans also tend to keep the shop tidy. Two blowers circulate the air and a wall thermostat controls the temperature. Overhead are ten 200-watt lights in two rows of five each.

Just inside the entrance door on the north wall is a 3½-foot-square wooden cupboard containing such small tools as gages, micrometers, bits, etc. On the wall opposite, a Mall electric-driven saw sharpener is hung. In front of two of the windows on the south side is a 15-foot wooden work bench, 30 inches wide. It holds such bench equipment as a 5-inch vise, a Kwik-Way valve-facing machine, a Sunnen hone, a Detroit belt lacer, a shop-made carburetor-testing machine, a Rimac valve-spring tester, a Storm connecting-rod aligner, and a Storm connecting-rod straightener. Other equipment which is used on the work bench includes two Weidenhoff tools, a generator-armature mica undercutter, and an armature growler for detecting short circuits. Six electric outlets in the wall permit ready use of this bench equipment.

In front of the other two windows in the south wall is a South Bend 18-inch x 10-foot lathe operating on 220-volt 3-phase current. In the southwest corner of the room is a Baldor battery charger with a 12-battery capacity. A Kemp Smith No. 2 milling machine is also situated in a well lighted spot in front of a window in the west wall.

Placed along the north wall are an Atlas 50-ton manually operated hydraulic press; a Canedy-Otto 27-inch drill press; a Stiles brake-relining machine; a Sioux portable flexible shaft grinder and buffer mounted on three rollers, which enable it to be moved readily to any part of the shop or garage; a 14-inch power hack saw; an AC spark-plug cleaner; and a Champion tester. The shop also contains a compressed-air outlet.

Sign Shop

On the second floor is a 28 x 24-foot room where a 3-man staff repairs, paints, or constructs wooden highway signs and markers, and repairs the metal signs. The latter are manufactured for the entire state in the Hamburg shop of the New York State Department of Public Works (see C. & E. M., Jan., 1945, pg. 30). The room has three large layout tables, 6½ x 4 feet, where the signs are painted, reflectors installed, or general repairs effected. Painting is done with stencils and hand brushes, since the absence of proper ventilating equipment does not permit the use of spray guns. Scotchlite signs are also made up there.

This shop also is well lighted by eight windows plus electric lights, and contains enough wooden racks for the storage of 7,000 signs or route markers. Three new power saws are on order, but until this equipment is delivered the shop is using a power band saw with a 10-foot blade.

Stock Room

Occupying the other half of the sec-

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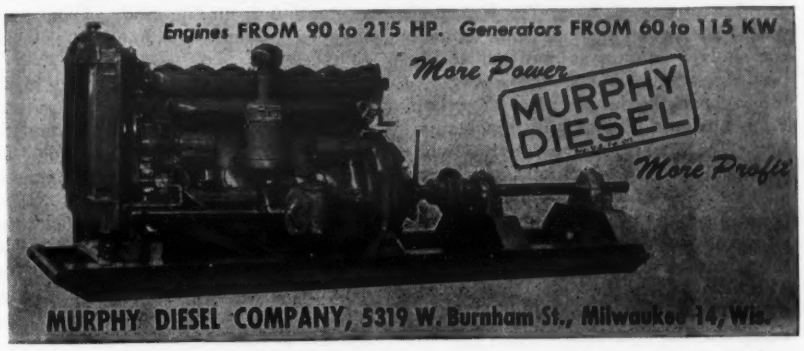

Engines FROM 90 to 215 HP. Generators FROM 60 to 115 KW
More Power
MURPHY DIESEL
More Profit
MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.

a long time since we roped this crane

Yes . . . Quite a long time. So long I'd just about forgotten the make of the rope.

So I said, "It's still in good shape, but I better find out where we bought it. We'll order another for a spare."

I looked it up. It was Purple Strand rope. It had been in service even longer than I figured. That's the brand we'll use on our jobs hereafter—all of 'em.

Bethlehem's Purple Strand is the ideal wire rope for heavy loads. It's built of premium steel, and it's tough . . . long-lasting . . . trustworthy. Buy it for cranes, hoists, and other machines engaged in severe lifting and handling service. It's built in many sizes, but all have the same high quality.

When you think WIRE ROPE

. . . think BETHLEHEM

Highway Shop

(*Continued from preceding page*)

ond-floor area is a partitioned-off stock room where the shop bookkeeper has his office and issues parts and supplies. Small valuable parts are stored in wooden cabinets, but the bulk of the supplies are kept in wooden bins. There are 7 sections of bins, 7½ feet high, with 7 shelves to each section. Some of the shelves contain as many as 16 bins holding smaller parts, or as few as 5 bins where the larger pieces are kept. Each bin is identified by a black number, 1½ inches high, against a white background. A decimal numbering system is used, with the shelves numbered from 1 to 7 beginning at the top, and the bins numbered from 1 up, running from left to right of the section. Thus bin 3.11 is the eleventh bin from the left on the third shelf. Letters designate the sections.

Such items as gaskets and fan belts, which are easy to spot for size, are hung up on the walls instead of being stored in bins. The replacement-part situation at the shop is worse at present than at any time during the war. This applies to all equipment except Ford; since parts of that make can be procured at the village agency, they are not kept in stock. Whenever any parts can be purchased locally it is not customary to keep a supply of them at the shop.

Storage Shed

The 160 x 40-foot storage shed has 11 bays with doorways the same size as those of the garage. A 3-bay partitioned-off section at the west end with metal doors is used for traffic signal-light trucks, and for storing the conduit, lights, and other equipment used in that work. A 2-bay section at the east end, also partitioned off, is used for tire storage.

The central 6 bays are used for the overnight housing of trucks, and such sundry equipment as 9 new Littleford 165-gallon bituminous kettles. Seed is also stored here in metal drums for protection from the raids of mice and pigeons. Each bay has two electric lights.

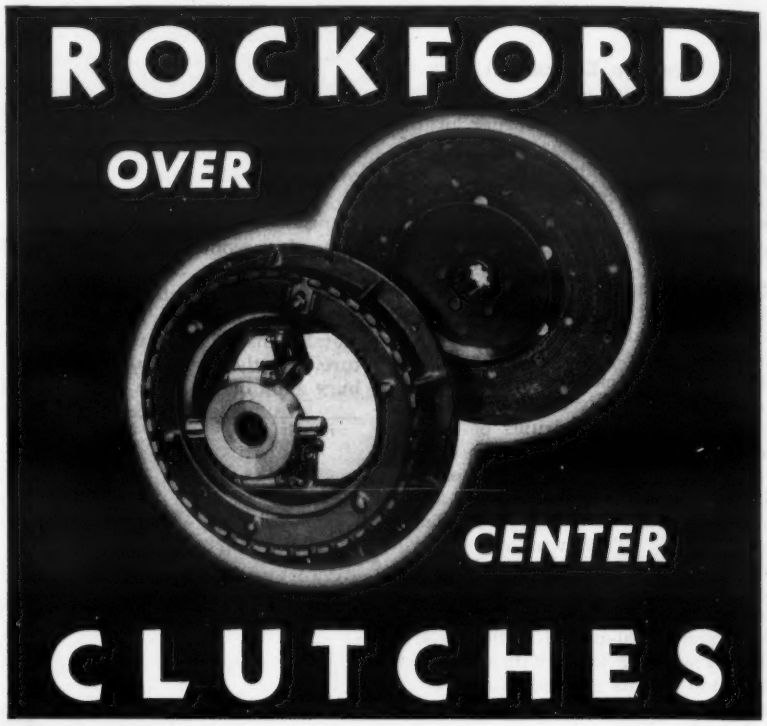
In the yard at the east end of the shed is a 6-foot-square incinerator, constructed of concrete blocks and fire brick, where refuse is burned. The yard also contains a 12 x 12-foot loading platform at truck-floor height. It was made from tiers of concrete block, after which the center was filled with sand and the whole covered with a 6-inch concrete deck. The 40-inch-high platform has a concrete access ramp 12 feet wide x 25 feet long.

Personnel

This newest of the ten New York district shops is headed by Superintendent Jack Herzy, who has held that post for the past 11 years. The serious labor shortage through the war period has been relieved this year with the return to work of several former service men. More mechanics could still be used, but the shop would first have to be enlarged and facilities increased to accommodate added personnel. The present force, besides the Superintendent, includes a bookkeeper, welder, painter, and seven mechanics. A clean shop, well laid out equipment, and pleasant surroundings—with such features as horseshoe pitching on the shop grounds during the lunch period—have produced efficient workmanship in this typical district highway maintenance shop. District 10 of the New York State Department of Public Works is headed by J. J. Darcy, District Engineer.

Whalen Joins Griffin

The appointment of Charles M. Whalen as Sales Representative has been announced by the Griffin Wellpoint Corp. of New York City. He has been with the Universal Atlas Cement Co. in New England and New York.



EASY OPERATION
HIGH TORQUE
POSITIVE ENGAGEMENT
LARGE DRIVING AREA *
SMOOTH RUNNING
INFREQUENT ADJUSTMENT
MINIMUM INERTIA

*The pressure plates in ROCKFORD Over-Center CLUTCHES have large area, accurately flat-ground surfaces for maximum contact with the facing material. Special alloy iron is used to withstand shock and heat strains. Provision is made for multiple driving, from the back plate. Have hardened-steel bearing insets, where the roller cams operate.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
314 Catherine Street, Rockford, Illinois, U.S.A.

GATKE Moulded Brake Blocks and Frictions. Made to fit all Shovels, Hoists, Cranes, etc.
GATKE Clutch Facings. Made for ALL requirements.
DURA-BLOK Wire-Back Moulded Brake Lining
GATKE Heavy Duty Woven Brake Lining

Operators all over the country agree that *when you have GATKE Brake Lining and GATKE Clutch Facings, you have the best.*

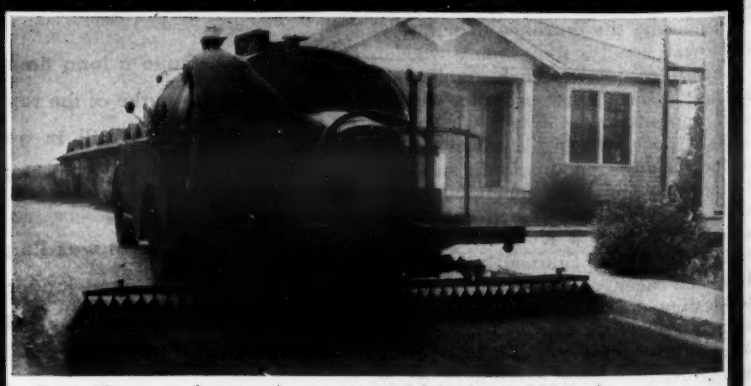
GATKE Asbestos Friction Products have been perfected for *every brake and clutch* — LARGE or small.

Experience and knowledge acquired in 28 years of development to meet operators' service requirements go into their making.

Whatever your equipment or service, just tell us what you want. We *understand* service requirements and *we have what it takes* to meet them!

GATKE CORPORATION
232 N. La Salle St. Chicago, Ill.

ETNYRE
"Black-Topper"
BITUMINOUS DISTRIBUTORS



Over 40 years of research accentuated by almost 100% of army wartime contracts . . . quality construction methods . . . use of only the best materials assure accurate, dependable performance with Etnyre "Black-Toppers", reduce maintenance and operating expense, cut labor costs. See your Etnyre Dealer or write us today for complete details.

E. D. ETNYRE & CO., Oregon, Illinois

One of the features of the Link-Belt Speeder Model T-4 crane (above) is the special side boom, permitting the unit to move along the side of a ditch or trench for excavating or clean-out, (shown at left).

Crane-Dragline Unit Is Tractor-Mounted

A fast, all-purpose tractor-mounted crane-dragline is made by the Link-Belt Speeder Corp. The unit comprises a Caterpillar D4 tractor on which is mounted a hydraulically controlled boom. It is said to be especially suitable for small-scale drainage and irrigation work.

Known as the "handyman machine", the Model T-4 crane requires no change of controls from crane to tractor. Its upper crane assembly can be quickly removed to make the tractor available for general work as well. The boom, 24 feet long, of the box type with lattice bracing, will lift 3,000 pounds on a 12-foot radius, the manufacturer says.

The Model T-4 crane is well fitted for intermittent but essential work, Link-Belt Speeder says. It is useful for clean-out service on main drainage canals, using a dragline bucket; and on lateral drainage ditches, using a special side boom and a clean-out bucket built to the contour of the ditch.

Full details on this crane can be secured by writing the Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago 9, Ill. Mention this news item, and ask for Folder 2032.

Manganese Welding Aid

Hints on repairing and reclaiming parts of many pieces of construction equipment are given in an 18-page booklet, "The Welding of 11 to 14 Per Cent Manganese Steels", issued by the Stulz-Sickles Co. Shovel teeth, jaw-crusher plates, tractor grousers, and many other wear points are shown in the booklet, with instructions as to their repair. The history and properties of manganese and of Manganal, an 11 to 13½ per cent manganese-nickel steel, are also featured.

Copies of this booklet can be obtained by addressing the Stulz-Sickles Co., 134 Lafayette St., Newark 5, N. J. Say you saw it mentioned in CONTRACTORS AND ENGINEERS MONTHLY.

Kentucky Research Unit Plans Extensive Testing

Formation of a Highway Research Board to study materials and design used in its highway construction has been announced by the Kentucky Department of Highways. The Board will maintain a preliminary-testing laboratory at Frankfort, and a research laboratory for its long-range program at the University of Kentucky located in Lexington.

The Board is headed by T. H. Cutler, State Highway Engineer, and H. St. G. T. Carmichael, Jr., First Assistant Chief Engineer. It includes L. E. Gregg, Associate Research Engineer in charge of the Lexington laboratory; John A. Bitterman, Director at Frankfort; D. V. Terrell and R. E. Shaver, members of the University's engineering faculty; Commissioner J. Stephen Watkins, and the following heads of Highway Department divisions: D. H. Bray, Design; G. H. Hailey, Rural Roads; T. R. Lannon, Planning; G. R. Logue, Construction; H. D. Metcalf, Maintenance; and H. R. Creal, Bridges.

Complete equipment is available to test the basic qualities of materials used in highways. Steel, paint, stone, concrete, bituminous materials, asphalt, and road oils are sampled on the job and taken through the testing laboratory at frequent intervals. Scaling on concrete roads, breaking up of bituminous pavements, and various other failures are investigated at the research laboratory.

Photographic Reproducing

Anything written, printed, drawn, typed, or photographed can be reproduced by the photocopy system, says the American Photocopy Equipment Co. The value of photocopying in engineering departments and general administrative offices is outlined by Apeco in a 16-page illustrated brochure. It can be obtained by writing the firm at 2849 N. Clark St., Chicago 14, Ill. Mention this news report.

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Superior Quality
BLADES
AND CUTTING EDGES

For any make of machine
Motor Graders, Maintainers, Scrapers, Drags, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blazers, Carryalls. Also—

CUTTING EDGES
WEARING BOOTS
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EXTENSION BLADES
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and
SCARIFIER TEETH

50 years of manufacturing blades has developed for you a special steel, milled through our own rolls and forged at the edges to give that extra wearing quality you need.

All widths lengths, and thicknesses. PUNCHED ready to fit your machine.

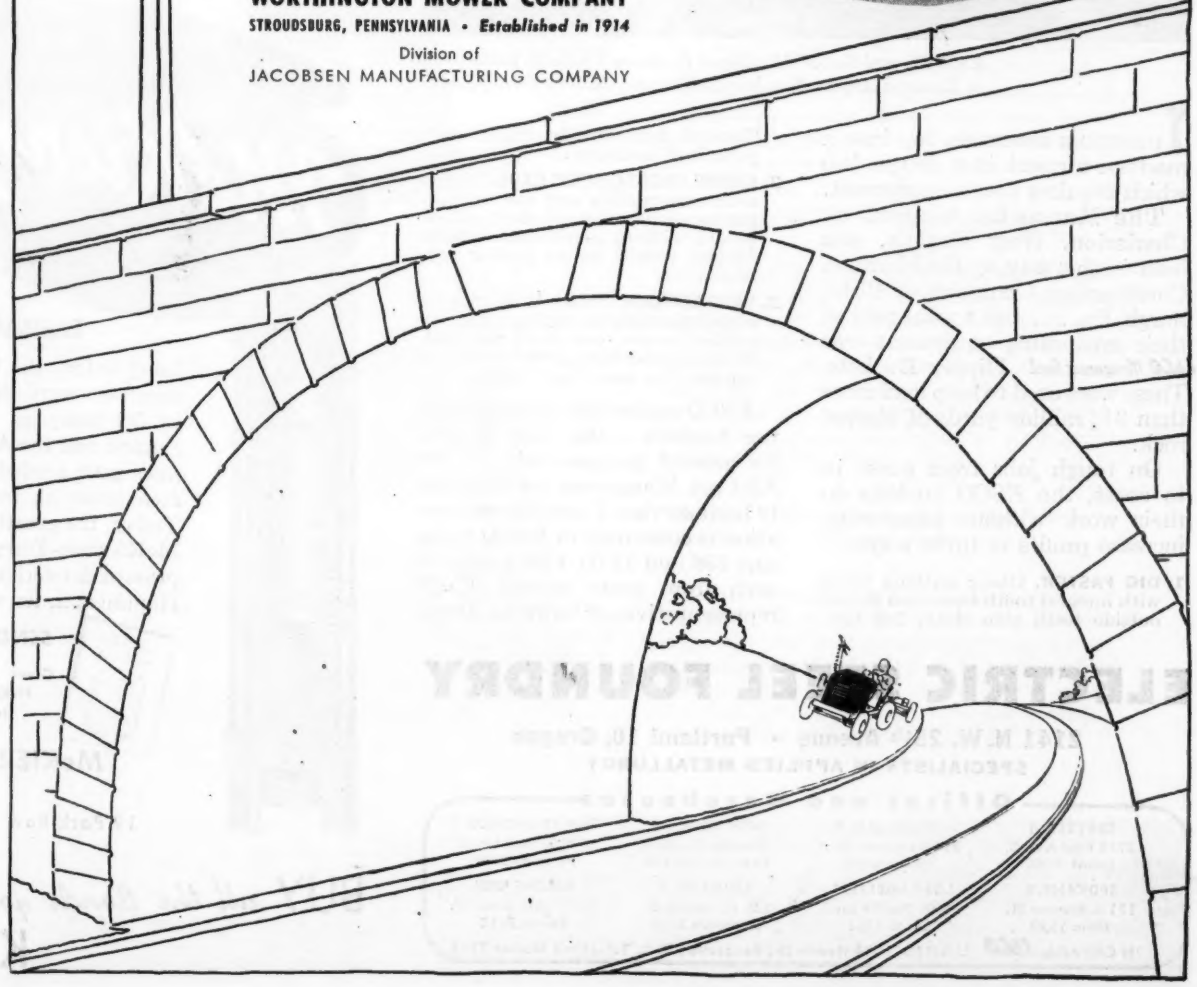
Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

Shunk
MANUFACTURING COMPANY
Established 1854
BUCYRUS, OHIO.

VERSATILE · FAST · ECONOMICAL
The WORTHINGTON "Highway Ranger"

The "Highway Ranger" is versatile—cuts everything from coarse grass on steep shoulder grades to turf on cloverleaf centers and island stretches. The "Highway Ranger" is fast—built to stand cutting speeds up to 20 MPH, highway speeds of 45 MPH. The "Highway Ranger" is economical—has 5 times the capacity of the tractor sickle-bar method. Write to the Worthington plant at Stroudsburg for catalogue and specifications, or phone your nearest Worthington distributor. They are located in all principal cities.

WORTHINGTON MOWER COMPANY
STROUDSBURG, PENNSYLVANIA • Established in 1914
Division of
JACOBSEN MANUFACTURING COMPANY



Roadside Development Booklet Issued by N. C.

Highway-department public relations in action was illustrated when the North Carolina State Highway and Public Works Commission recently prepared and distributed a 20-page booklet called "Roadside Development and Highway War Memorials".

Its purpose was to inform as many persons as possible of the Commission's roadside-development policy, and thus avoid possible embarrassment over unsuitable local projects. The booklet was therefore given wide distribution. It was sent to all newspapers with a news release. By direct individual mailing, one copy went to all public and college libraries, chambers of commerce, utility companies, women's clubs, garden clubs, men's civic clubs, and American Legion and Legion Auxiliary Posts in North Carolina. Also, each member of the recently organized Roadside Development Council of North Carolina received a copy by mail.

The booklet was made available to County Agents, Home Demonstration Agents, and leaders of Home Demonstration Clubs through the Agricultural Extension Service.

A discussion of the place of roadside development in the civic picture, the principles to be followed, suggestions to civic groups working for more attractive highways, advice on memorials, and the Commission's regulations for roadside planting feature the pamphlet.

Truck's Abilities Rated On Fatigue-Factor Basis

A new point system for rating the full carrying capacities of International motor trucks under all operating conditions has just been announced by International Harvester Co. The system is said to make it possible to calculate accurately the extra load which any International may carry where operating conditions are better than those on which the GVW rating has been based.

Five fatigue factors are employed in estimating the extra load. Each of these is rated separately. The five are then totaled to furnish the key to the truck's performance ability under the load, road, grade, and other conditions.

Among the advantages claimed for this new rating system is the fact that the operator can get the most out of his trucks in terms of loads carried. It will tell him how much more he can carry under favorable conditions. He can hold operating costs at a minimum by observing the load limits allowed by the point system. He can reduce maintenance costs by adhering to the new system, since it will warn him against overloading his trucks, International says.

This new rating system has been published in a sales engineering bulletin, and is being distributed to all International truck branches and dealers.

New Junior Power Shovel

The Byers Junior partial-swing ⅜-yard excavator is described in a colored broadside just issued by the Byers Machine Co. This newly designed modern unit is suitable for small grading, county road work, ditching, and other jobs that require a small economical shovel with a good capacity. It can be used as a shovel, crane, dragline, or backhoe.

Copies of the broadside, Form PW-Jr. No. 1, and other details about the Byers ⅜-yard Junior, can be secured by mentioning this notice. Write the Byers Machine Co., 340 Sycamore St., Ravenna, Ohio.

ESCO 2¼ yard Cast-Welded Dipper Bucket on Lorain 82, loading rock at Kanawha Airport. Note how ESCO dogleg bail cradles large rocks.

TURNING a mountain top into a modern airport is a tough job which requires tough equipment.

The Kanawha Airport at Charleston, West Virginia, was built in this way by the Harrison Construction Company of Pittsburgh, Pa. . . . and a vital part of their excavating equipment was *ESCO Manganese Steel* Dipper Buckets. These were used to help load more than 3½ million yards of blasted rock.

On tough jobs from coast to to coast, the *ESCO* buckets do their work without pampering, increase profits in three ways—

1. **DIG FASTER.** Clean cutting front with integral tooth bases and flaring outside teeth give clean, full bite. Tapered box permits quick, complete load discharge.
2. **CARRY GREATER PAYLOADS.** Hollow arch construction and use of manganese shock-resistant steel reduces weight without sacrificing strength. Lighter weight means greater payloads.
3. **LAST LONGER.** Strain is distributed evenly throughout the bucket. Parts subject to wear and shock are made of manganese steel, grow harder and tougher the more they work.

ESCO makes two types of dipper buckets — the Cast-Welded for general purpose use and the All-Cast Manganese for extremely hard service. Complete information is contained in *ESCO* bulletins 156 and 114B. Get a copy of each from your nearest *ESCO* representative, or write us direct.

ELECTRIC STEEL FOUNDRY

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Elliott's LIN-O-BLU Ammonia developed papers should be used by you. They are a STAR PERFORMER every time. Available in thin, medium or heavy weights. Write for testing samples. Address Dept. M-7.

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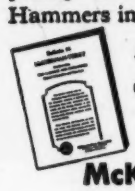
McKiernan-Terry

DOUBLE-ACTING PILE HAMMERS

used 'round the world

Long before the late war these pioneer double-acting pile hammers were the choice for major construction projects as far away as the Orient, Australia, India, as well as Europe and the Americas. Throughout the war, these hammers gave needed aid to Army and Navy construction and reconstruction forces in every theatre of operation . . . . Today, the greatly expanded facilities of two large, modern McKiernan-Terry manufacturing plants offer contractors prompt deliveries of McKiernan-Terry Double-Acting Pile Hammers in ten standard sizes.



SEND FOR BULLETIN NO. 55

Gives full information, specifications, diagrams, etc., on McKiernan-Terry Double-Acting Pile Hammers and Extractors. Write for it today. MT-1006

McKIERNAN-TERRY CORPORATION

Manufacturing Engineers

19 Park Row New York 7, N. Y.

BUY *all the Bonds you can . . .*

KEEP *all the Bonds you buy*

County Road-Mix

(*Continued from page 1*)

process.

A row of about thirty 18-inch-diameter eucalyptus trees stood on the new road shoulder. They were pulled down by means of cables attached to the bulldozer. The roots were grubbed out by prison labor, and the trees were sawed up and hauled off to the prison farm to be used for fuel. After the roadbed was bladed to blue-top grade, it was opened to traffic for a period of one month to let it consolidate.

A Bucyrus-Erie 10-B shovel was then spotted in a pit 1½ miles away, with a ¾-inch-mesh loading screen. Pit material was bank-run gravel, well graded from No. 40 mesh size up to about ⅝ inch. It was loaded in five county dump trucks, hauled to the Slover Avenue site, and dumped in piles in the center of the street. Truck loads were spaced on the basis of a 3-inch layer of uncompacted material 30 feet wide, amounting to approximately 4,900 tons per mile. The dumped material was leveled and spread by two motor graders, an Austin-Western 99 and a Caterpillar No. 12.

The select base was then opened again to traffic for about six weeks in order to develop all weak spots in the subgrade, as far as possible.

Road-Mixing

A Gardner mixer, some commercial asphalt trucks from the Gilmore Oil Co., a 7-ton weighted pneumatic-tire roller, two motor graders, and a small gang of men from the San Bernardino yard were then brought back to Slover Avenue. The motor graders cut half the 30-foot strip and heaped it in a sharply sloping windrow in the center of each half section. The Gardner mixer, mounted on a Caterpillar No. 12 motor grader, started in at one end of the job and passed through the windrow, picking it up and mixing MC-3 Gilmore asphalt with the sand and gravel. It has worked out best near this location in San Bernardino County to shoot the asphalt in fairly heavily for the first pass, so that the material behind the machine looks definitely overoiled. This method was used here.

The windrow behind the Gardner mixer came out somewhat flattened, so the two motor graders again heaped the material behind the mixer. In this process a not-inconsiderable amount of dry material was picked up and rolled by the motor graders, all of which added a great deal to the mixing. Four passes were made through the windrow in this manner until 1¾ gallons of asphalt had been mixed per square yard.

The Gardner mixer was equipped with a speedometer and an asphalt gage. Experienced road-mixer operators correlate these two instruments by calculating the volumetric content of material in the windrow, and can apply

San Bernardino County in California uses a Gardner road-mixing machine for bituminous surfacing on many of its highways.

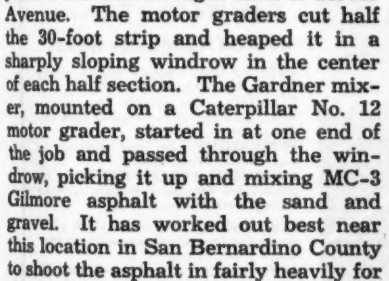
road oil with very accurate results.

Commercial asphalt-tank trucks, usually hauling 5,000 gallons, hooked their hose directly on to the mixer connection, and stayed with the mixer during the operation. When the asphalt was mixed in with the base material, it had reached a temperature of 300 degrees F by means of a heating element in the Gardner mixer.

The windrow was then cut down in two passes, leveled with two more passes by the motor graders, and a 7-ton ballasted pneumatic-tire roller was used until the surface was hard and thoroughly ironed. Hours of rolling were necessary. Since this type of roadwork usually is done during the dry season, it was not necessary to press down or "case-harden" the surface for protection against rain while construction was in progress. Construction joints were cut square and matched with the aid of a couple of laborers with shovels and rakes.

The same procedure was then re-

(*Concluded next page, Col. 3*)



A Complete Line of Builders' Derricks and Winches—nationally known for dependable service and long life.

Write for Catalog or send your problems to our Engineering Department

The Sasgen line is handled by leading equipment distributors everywhere.

SASGEN DERRICK COMPANY
3101-27 W. Grand Avenue, Chicago 22, Ill.

TRUSCON TRU-CURE

THE FAST, EFFICIENT LOW-COST CURE FOR CONCRETE!

On cement walks and patch jobs all that's needed for curing is an ordinary insecticide sprayer such as the worker in photo (left) is using. No cleaning up afterward.

On big jobs the "wand" type sprayer is used with portable compressor. TRU-CURE is available as clear liquid or with fugitive dye for easy inspection.

For minimum evaporation loss and better cured concrete—for savings in labor, time and material—use TRUSCON TRU-CURE. Curing is simply and easily applied by spray *immediately* after finishing—no waiting. Provides 97% water retention in the critical first 24 hours. That means a job free from crazing and hair checks—insures hardness, strength, durability.

●

Meets Specifications of State Highway Departments and U. S. Army Engineers

●

At the left you see a typical recent TRUSCON TRU-CURE job in progress. The workman with the "wand" type sprayer is right on the heels of the finishers. TRU-CURE may be had with a fugitive dye, permitting the operator to prevent thin spots—insuring an *even* protective, water-seal coating. No bags, no paper, burlap or cotton mats needed.

●

Curing Keeps Up With the Pouring

●

In the progress picture at left you see the concrete mixer pouring just ahead of the curing application. This is the time, labor and material saving process—reasons that have brought approval from U. S. War Department Engineers and State Highway Engineers. Nothing bulky to handle, no waiting, no uneven curing. There is no coal tar, pitch or asphalt in TRUSCON TRU-CURE.

●

Spray It On—The Curing Is Finished—No After Care

●

Contractors on big road jobs have welcomed the special Truscon Spray Machine, a 9-nozzle applicator that does the job swiftly, economically, scientifically. Sprayer, as in photo at left, operates from a bridge spanning the work. For description of this machine and complete data on TRU-CURE write Dept. 1A.

TRUSCON LABORATORIES

Two of Goodyear's new wire tires—the Hard Rock Lug, used in off-the-road operations, and the Hi-Miler, which is built for highway use.

Wire-Rubber Tires

Day-by-day performance of rubber tires which have built-in metal-wire reinforcement is being studied by engineers of the Goodyear Tire & Rubber Co., Akron, Ohio. The firm expects general release of the tires soon.

Fine metal wire of high tensile strength is bonded with the rubber to provide the foundation of this unusual tire. It is designed for heavy-duty service in the construction and kindred industries, and closely resembles the conventional rubber tire in appearance.

It is said to have great resistance to bruise, and to be less susceptible to cutting. Its greater strength was also indicated by tests made during the war.

Armco Decentralizes Rail Sales and Construction

Armco Drainage & Metal Products, Inc., Middletown, Ohio, has announced a reorganization of its Construction Division and the dissolution of the Armco Railroad Sales Co. Activities of both units have been decentralized and are now being handled by various Armco divisions.

E. T. Cross, engaged for 19 years in Armco construction work and sales of drainage products to railroads, a Vice President of the firm, will serve as coordinator of its construction activities. He will be assisted by W. B. Roof, former Division Engineer of the Construction Division.

In other changes, D. R. Baird has become Construction Superintendent for the O'Neall Division at South Bend, Ind. J. D. Faylor is now Iowa-Nebraska Division Engineer at Des Moines. H. R. Speir is Superintendent of Construction for the Southwestern Division at Houston. C. E. McGraw is Construction Superintendent for the Hardesty Division at Denver.

West-coast construction will come under C. M. Colvin, who is also assistant to K. A. Smith, Manager of sales to railroads at Berkeley. Construction in the Dixie Division is supervised by J. F. Hunter, Atlanta; by Nick Rozema in the Missouri-Kansas Division at Topeka; and by P. O. Hansen in the Central Division at Middletown.

Railroad sales and construction activities in the Eastern Division are now under W. O. Robertson at Baltimore. G. R. Betts has been transferred to the O'Neall Division at Chicago, and N. A. Powell to the Southwestern. Both are Managers of railroad sales. Similar sales will be supervised in the Hardesty Division by Ralph N. Tracy, Denver; in the Northwestern Division at Minneapolis by H. S. Claybaugh; in the Central at Cleveland by C. H. Anderson; in the Dixie at Atlanta by Van W. Davis; and in the Missouri-Kansas at St. Louis by Felix Truss.

Generator Maintains Constant Voltage Load

Constant voltage in spite of the "ups and downs" of the load is a design feature of the new ac generator announced by the Electric Machinery Mfg. Co. Known as the Regulectric generator, this unit is built for engine generator sets. It uses the principle of electrical resonance to hold the voltage constant.

The regulating circuit is built into the generator. It has no moving parts, and is mounted on the exciter. The circuit is set at the factory to hold voltage within 2 per cent in either direction, from no load to full load with normal engine-speed regulation.

The generator is of the revolving-field type, and at present is built in these ratings: 5 and 7½-kw, 60-cycle, single-phase, 1,200-rpm; 7½ and 10-kw, 60-cycle, 3-phase, 1,200-rpm; 7½ and 10-kw, 60-cycle, single-phase, 1,800-rpm; and 10 and 15-kw, 60-cycle, 3-phase, 1,800-rpm.

The Regulectric a-c generator is fully described and illustrated in Publication 186, available to readers of CONTRACTORS AND ENGINEERS MONTHLY. Mention this news item when writing the Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis 13, Minn.

Rugged Thermometer

A stainless-steel thermometer, said to have a 1 per cent accuracy range over the entire scale, has been announced by W. C. Dillon & Co. of Chicago. The unit uses either a 3 or 5-inch standard dial, and a ¼-inch stem of 5 or 9-inch length. The stem immerses in 2 inches of liquid or 4 inches of gas. All-metal welded structure, no gears, and an anodized aluminum dial are other features of the unit.

Full details can be obtained from the firm on mention of this news item. Its address: 5410 W. Harrison St., Chicago 44, Ill.

County Road-Mix

(*Continued from preceding page*)

peated on the other half of Slover Avenue and the right half opened to traffic. Edges were left sloped neatly into the road shoulders. Slover Avenue will receive a seal coat about a year after this job was done. At that time about 0.1 gallon of 50-50 emulsified asphalt per square yard will be applied. This same treatment is generally given to new road-mix in San Bernardino County.

Job Costs

The job foremen were required to make a daily report showing labor distribution and hours of heavy-equipment use, identifying all equipment. This information was then kept up to date in the county records, and when the job was finished a very accurate field recapitulation was possible. Each job, as it is authorized, is posted in the San Bernardino County central garage on a big blackboard, and given a corresponding job number. This key number is then used by foremen and operators in making their reports. The whole procedure results in accurate cost distribution.

The final report on the Slover Avenue project was as follows:

Job No. 696

Grading	$1,665.54
Cleaning street shoulders	3.28
Pipe culverts	28.63
Oiling	375.92
Placing gravel	1,026.23
Road oil	3,023.24
Removing and trimming eucalyptus trees	542.14
Moving to and from job	77.36
Supervision	269.12
Hauling supplies	10.32
Lighting warning lanterns	31.12
Shovel work (loading material)	229.18
Miscellaneous labor	61.16
Blacksmith work	135.00
Cable and clamps for tree removal	296.55
Pipe	355.96
Truck rental	30.00
Construction of distribution line	80.57
Miscellaneous job items	126.12
Steel	13.35
Total field cost	$8,380.79

Howard L. Way is County Surveyor and Highway Commissioner of San Bernardino County, with Ralph W. Motherspaw, Assistant Highway Commissioner.

Use KOTAL Master Mixes for Bituminous Surfaces All Year 'Round
Eight Working Features of KOTAL Master Mixes
EASY TO USE. Quickly mixed, ready to lay. No preheating or drying.
STABILITY. Cure quickly and permanently. Do not shift, ravel or pick up. Open sooner to traffic.
WORKABILITY. Do not adhere to equipment. Work easily.
LONG-TERM STOCK PILES. Can be stock-piled for many months without losing workability.
SAVE TIME. Quickly made stock piles ready for immediate use without frequent fresh mixes.
SAVE LABOR. Actual road records prove fewer labor hours required.
SAVE MONEY. Savings in time and labor mean economies in road costs.
EXTEND PAVING SEASON. All-weather workability permits more months of operation.

It's easy to use KOTAL Master Mixes

It's easy to keep bituminous surfaces in condition all the year 'round with KOTAL Mixes. These cold mixes are prepared by advanced scientific methods, using high-grade cutback asphalts or road tars. KOTAL Mixes, tested and proven in more than six years of hard use, produce tough, durable surfaces and solid repairs that resist stripping and stand up indefinitely.

IT'S THE KOTAL PROCESS THAT MAKES THE DIFFERENCE

Write for your copy of booklet which tells the story of KOTAL Master Mixes. We will also send you the name of your nearest supplier.

KOTAL COMPANY
360-68 Springfield Ave. ★ Summit, N. J.

KOTAL Master Mixes
The Advanced All-Weather Aid in Building Better Roads

For 69 Years Builders of Fine WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio
Watch for Post-War Models

IN THE HEART OF DOWNTOWN MILWAUKEE

450 ROOMS of COMFORT
. . . . Friendly hospitality. Coffee Shop, Cocktail lounge, Garage and parking lot. Remember—Milwaukee's Best Buy
with bath—from $2.75 without bath—from $1.65
Owner Operated by
THE MILWAUKEE HOTEL
Wisconsin Co. Lewis S. Thomas, Mgr.
HOTEL WISCONSIN

"There's a robin's nest in it!"

Report on Highway Safety Conference

The full use of highway-engineering "know how" was sought by the recent Highway Safety Conference in its attempt to reduce the nation's accident toll. Sponsored by the President, the Conference set forth an extensive program designed to make road travel safer.

Major recommendations relative to highway engineering that were made by the Conference include: greater attention to safety and operation factors when planning new highways and future automobiles; elimination of present-day hazards, and avoidance of similar ones in future building; improved maintenance; better lighting; uniform codes for the regulation of highway use; and closer coordination of the activities of all groups concerned with highway planning, automobile making, and traffic control.

The report of the Conference Committee on Engineering has been issued in a 52-page pamphlet, as have reports on accident records, motor-vehicle administration, education, enforcement, laws and ordinances, public information, and organized public support. The work and recommendations of the Conference are summarized in a 24-page pamphlet called "Action Program".

Copies of these reports can be obtained from the U. S. Government Printing Office, Washington 25, D. C. "Action Program" costs 10 cents per copy; "Engineering" is 15; "Laws and Ordinances", 20; and "Public Information", 5 cents. All other reports cost 10 cents each. The entire set of nine pamphlets is $1.00.

Electrode Holders Built in Four Models

A new line of electrode holders for manual arc welding has been announced by the Tweco Products Co. Known as the Twecotong line, it includes both insulated and semi-insulated models. Each type is made in two sizes.

A conventional tong-type holder, Twecotong features an almost indestructible molded-laminated glass-cloth Bakelite insulation which is keyed to the holder casting. The tensioning spring is firmly seated on fiber upset washers and is protected from spatter by non-binding Neoprene tubing. A well-ventilated handle, together with a good cable connection, assures a cool-running holder, Tweco says.

The fully insulated model Twecotong comes in a 300-ampere size for 1/16 to ¼-inch electrodes; and a 500-ampere size for 3/32 to ⅜-inch electrodes. Semi-insulated models are made in the same sizes and capacities, for use where such low-cost tools are desired.

Full information on these electrode holders and on Tweco cable connections for welding can be secured from Tweco Products Co., English at Ida Sts., Wichita 7, Kans. Just mention that you saw it in CONTRACTORS AND ENGINEERS MONTHLY.

Data on Calcium Chloride Use in Soil Stabilization

An extensive review of literature available on the use of calcium chloride in the granular stabilization of roads has been published by the Highway Research Board of the National Research Council. Research Report No. 2F runs to 55 pages and includes a 22-page index and bibliography.

The history of stabilization and its principles, as well as data on calcium chloride, soil tests, frost heaving, and similar subjects are covered in the text. Construction, maintenance, and cost of roads stabilized with calcium chloride are discussed. The possibilities for future research are outlined.

Copies of Research Report 2F, "The Use of Calcium Chloride in the Granular Stabilization of Roads", can be obtained from the Highway Research Board, Washington 25, D. C. The study was made by F. L. Cuthbert, Research Engineer for the Board. Price: 25 cents.

MATERIAL HANDLING

Material handling is a dirty job for both men and machines . . . but it isn't too dirty or too tough for Wisconsin Heavy-Duty Air-Cooled Engines. This Jeffrey Model 209B Portable Scraper Conveyor, powered by a Wisconsin 4-cylinder air-cooled engine, is made by Jeffrey Mfg. Co., Columbus, Ohio.

If your equipment requires rugged, dependable power within a range of 1 to 30 hp., you can't do better than to specify "Wisconsin".

WISCONSIN MOTOR Corporation
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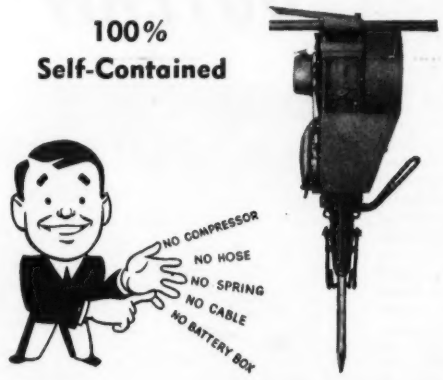
World's Largest Builders of Heavy Duty Air-Cooled Engines

100% Self-Contained



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Gasoline Hammer

PAVING BREAKERS

The "one-man" gang of all work that goes most anywhere, any time and does almost everything!

Use it to BUST concrete, DIG shale and clay, TAMP backfill, DRIVE spikes, ground rods, etc.

No cumbersome auxiliary power equipment to tow around—no hose or cable to kink and tangle—completely self-contained.

A MONEY, TIME and LABOR-SAVING tool.

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SYNTRON CO.
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FORD TRUCKS LAST LONGER!

The Average Ford Truck is almost 9 years old

Ford

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Was Non-Delivery of Materials Due to Government Regulation?

When a lumber company sued a contractor for failing to pay for materials delivered, the contractor counterclaimed for damages for failure to deliver all the lumber called for by the agreement. As a preliminary to trial, the trial judge, Judge Moscowitz of the United States District Court for the Eastern District of New York, passed upon the validity of the lumber company's several excuses for the deficient delivery. (Vernon Lumber Co. v. Harcen Construction Co., 60 Fed. Supp. 555.)

First, the lumber company relied upon the fact that the mill from which it, in turn, had contracted to buy the lumber was prevented from delivering through the Navy's absorbing the mill's output. The company pointed to a WPB rule: "No person shall be liable . . . . for any default under any contract or order which shall result directly or indirectly from compliance with any rule, regulation, or order of the War Production Board." This defense was disallowed by the judge, who said that the rule protects only the party whose contract performance was interfered with through having its product taken under priority right—in this case, the mill. So, the mill might have a good defense against the lumber company's claim for damages for non-delivery, but that would not give the lumber company an excuse for breach of its contract with a third party, the contractor.

Judge Moscowitz further noted that the WPB regulation relied upon by the lumber company provided that an order having lower rating must be accorded priority over an order with higher rating if the former calls for delivery at an earlier date and both can be filled in time. The lumber company failed to show that this provision was not applicable.

Another weakness in this defense lay in the lumber company's failing to show that it could not have supplied itself with the necessary materials through another mill when it was disappointed in getting them from the mill upon which it relied for delivery.

As an independent defense, the lumber company claimed that it had been orally agreed between it and the contractor that it should be excused from delivery on being unable to secure the necessary lumber from the particular mill. That defense was disallowed because the asserted oral agreement was made before consummation of the written contract sued on. It is a general rule of law that the terms of written contracts can not be enlarged or contradicted by showing oral negotiations leading up to the final contract reduced to writing, in which those negotiations are ignored. However, the court did recognize the right of the lumber company to have the written contract reformed to include any oral agreement which was omitted through mutual mistake or through mistake of the lumber company and fraud of the contractor.

A third defense asserted that there was one clause in the written contract which in itself was sufficient to excuse non-delivery of the lumber. That was a condition excusing non-performance due to "conditions beyond control". Rejecting that contention, Judge Moscowitz said: "'Conditions beyond control' refers to an unforeseeable act of God or other extraordinary cause which could not reasonably be anticipated by the parties. It would cover an unforeseeable change in the law which made performance impossible. But it does not refer to difficulties in performance which have developed since the making of the contract but which could have been anticipated. The regulation of the War Production Board under which the plaintiff seeks to be relieved of its duty to deliver the lumber was in existence when the contract was made and the withdrawal of plaintiff's contemplated supply by operation of the regulation is a development which it is presumed plaintiff anticipated or could have anticipated."

However, the court's opinion shows that if the lumber company could prove that it was *impossible* to secure lumber to fill its contract with the contractor, non-delivery would be excused. The contract did not call for delivery of lumber manufactured by any particular mill, and the lumber company could not plead impossibility of performance without showing "that it made every attempt which could be considered reasonable in the trade to find an alternative source". But a defense of impossibility would not be negatived if the contractor could have obtained a supply of lumber at "some backwoods source not known to any one but the inhabitants of the surrounding area". On the other hand, impossibility of securing lumber would not be shown by mere proof that the company tried to obtain it through "its regular and usual channels".

Blasting Cap Injures Boy; Determination of Liability

"Boys will be boys" is an adage which all contractors and their construction foremen should bear in mind. It must not be forgotten that playing youngsters are prone to expose themselves to dangers which more mature people would shun. An object lesson will be found in a case decided by the United States Circuit Court of Appeals, Third Circuit. (American Mutual Liability Insurance Co. v. Buckley & Co., 117 Fed. 2d, 845.) The insurance company was held bound to reimburse the Buckley Co., a contractor, for money paid to settle a claim based upon an injury that occurred as follows:

A 13-year-old boy saw some detonating caps lying on a pile of lumber on a fence outside the site where the contractor was excavating. Despite warnings by his companions, the boy pocketed one of the caps and two days later attempted to set it off with matches. Failing in this, he threw the cap into a bonfire and was seriously injured as he went towards the dying embers where the cap belatedly exploded. The boy's parents sued the contractor. The contractor's insurer against accident liability refused to defend, claiming that the policy did not cover the accident. The contractor settled the claim for $3,250. The insurance company asked the courts to declare its freedom from liability, but lost the suit.

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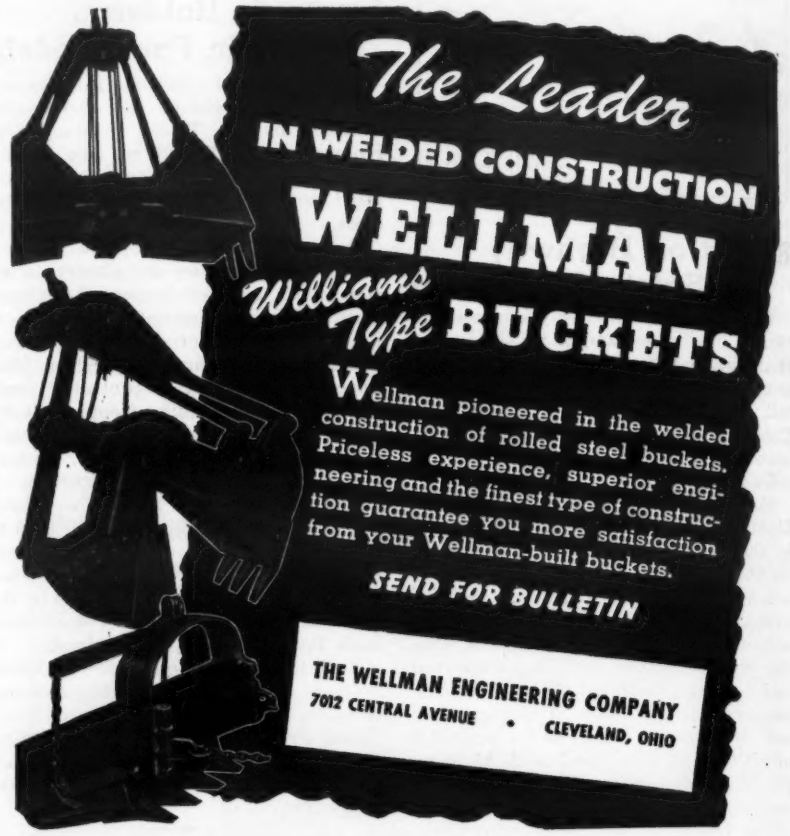
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Williams Type BUCKETS
Wellman pioneered in the welded construction of rolled steel buckets. Priceless experience, superior engineering and the finest type of construction guarantee you more satisfaction from your Wellman-built buckets.
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"OUTLAW" ROAD SURFACE BREAKUPS

This state's highway subdrainage program was speeded and simplified by use of long lengths of sturdy, flexible perforated pipe.

Until 1940, pavement breakups were as "reg'lar as groundhog day" each spring on certain New England highways. Then state engineers went into action with a thorough subdrainage program. Today that work is paying off in firm, smooth pavements, less maintenance work, reduced costs. A vital factor was — and is — perforated metal pipe that intercepts ground water in the trouble spots. They keep pavement foundations stable and firm.

You can "outlaw" costly breakups the same way with ARMCO Perforated Pipe. Installation is easy and fast, and costs are low—thanks to the long pipe lengths, fewer joints, light weight, and freedom from breakage. Once in the ground, ARMCO Perforated Pipe has the flexible strength needed to resist traffic weight and impact, vibration and disjointing. Perforations instead of open joints reduce the hazards of clogging.

Remember that good drainage is costly only when omitted. Write us for literature on Designed Subdrainage. Armco Drainage & Metal Products, Inc., and Associated Companies, 785 Curtis Street, Middletown, Ohio.

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There's a *La Crosse* Trailer for Any Load . . 3 to 200 Tons

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"TWO-FISTED" PERFORMANCE

Look to the LA CROSSE Line of ALL WELDED Trailers to Meet the Most Exacting Work Requirements.

LA CROSSE TRAILER CORP. LA CROSSE, WISCONSIN

Avoid Legal Pitfalls

(Continued from preceding page)

The insurance company's lawyers argued that the real cause of the accident was the boy's own disregard of his companions' warnings that it was dangerous to try to explode the cap. They argued that it was not the fault of employees of the contractor that the caps were left exposed. But the court replied that the contractor, acting through its employees, should have foreseen that some youthful prankster might do just what this boy did.

The insurance company also relied upon a clause which limited its liability to accidents occurring "in the performance of the operations carried on by the" contractor. But the court said, in effect, that this accident must be considered due to "negligent acts of servants of the contractor" who "permitted the detonating caps to come to rest in a dangerous position".

Finally, the court declared that even if the suit brought on behalf of the injured boy against the contractor had been without legal grounds, which it was not, "it was very clearly the sort of suit which the policy was designed to cover". The policy explicitly bound the insurance company "to settle or defend each claim and suit," for accidents occurring in the performance of the contractor's operations, "even though wholly groundless, brought against the" contractor.

Related Partnerships Ruled Legally Distinct

Two firms of contractors, each a partnership, associated themselves in taking a job in Texas. One of the firms and one of the members of the other associated themselves in taking a job in Louisiana. A single surety company bonded both jobs separately. In connection with the Texas job, the associated contractors agreed to indemnify the surety company against loss under its bond or bonds.

In a suit by the surety company against the contractors for indemnity, the United States District Court for the Western District of Louisiana decided: (1) that the contractors on the Texas job comprised a distinct group from those on the Louisiana job, and (2) that the surety could not, therefore, claim the proceeds of the Louisiana contract to indemnify it under the bond given on the Texas job. (Maryland Casualty Co. v. Glassell-Taylor Co., 63 Fed. Supp. 718.)

Collusive Bid Backfires

That a contractor takes a serious risk in entering into any agreement which tends to restrict bidding competition is shown in a California case. In that case a city averred that a contractor had entered into agreements with other contractors that they refrain from bidding on a paving job so that the *low* bidder could bid high. The court declared that the city, if its averments were correct, was entitled to collect, upon behalf of the owners of property specially assessed for street paving, the contract price it paid to the contractor.

The Supreme Court noted that the purpose of a statutory requirement for inviting sealed bids on public work "is to secure a price based upon competition. Any agreement which tends to deprive the Government of competition in bidding is unlawful, . . . and where it is shown that the bids made were collusive, and a contract is awarded by public officers in ignorance of such a combination, the resulting contract is void as against public policy." (104 Pac. 2d, 30.)

The court declared that such a suit was not barred by a statute limiting the time for correcting special assessments, because the city did not sue to set aside any assessment. It sued, rather, to collect, on behalf of assessed property owners, the money which had been paid to the contractor on a void contract.

Overturned Gravel Scow Causes Judicial Headache

Wouldst know why most judges have gray hair? Then read about the legal problem that was tossed into the lap of one of the judges of the United States District Court for the Southern District of New York, in the case of "The Henry E", 61 Fed. Supp. 327.

"The Henry E" was a gravel scow that was chartered by its owner, the E Company, to the G Company for an indefinite period. E agreed to furnish a captain with the scow. The captain quit but E did not replace him. G caused a dredging company to place the scow alongside the latter's dredge to receive a cargo of sand and gravel. The dredging company then towed the loaded scow to a position near another scow, owned by a fourth company. Here, because it was overloaded, it overturned, damaging itself and the other scow. The overloading was due to failure to make proper provision for pumping water from the wet cargo of sand and gravel on "The Henry E"; the negligence was in turn caused by not having a captain aboard. Several claims and counterclaims, filed under the maritime laws, were consolidated for trial. Here is the gist of conclusions reached by the court:

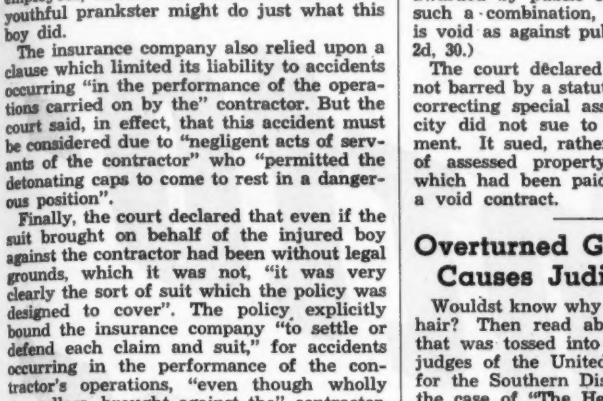
The dredging company was *primarily* liable to E Company for damage to "The Henry E", because it should not have loaded the scow with a full cargo, knowing that there was no one aboard to make proper provision for pumping out water. There was a lien against the dredge which loaded the scow for the amount of damage. The G Company, hirer of the scow, was *secondarily* liable for using it without a captain aboard. For like reasons, the dredging company was primarily liable, and G Company secondarily liable, for injury sustained by the fourth company's scow when "The Henry E" overturned. E Company also was liable for the damage to the innocent scow, because of its failure to provide a captain for "The Henry E" when it was notified that the captain originally assigned to the craft had quit. As between the parties held liable, of course, the court recognized that the one secondarily liable had a right to be reimbursed by the one primarily liable for whatever it would have to pay to the third party as to whom liability existed. And the E Company would be entitled to reimbursement from the dredging company and the G Company for whatever it would have to pay the owner of the innocent scow because of its tertiary liability.

What Is a "Working Day"?

It is probably impossible to draw a construction contract that will not contain at least one "germ" of a potential lawsuit. Often the weak spot is a word or phrase which is elastic in meaning. Take, for example, a contract which requires a job to be finished within "80 *working* days". Unless there happens to be a specific clause in the contract which defines a working day, it may take litigation through two or more courts to settle a dispute on that point.

A Connecticut contract required completion by the end of 80 working days, dating from a specified day. The Supreme Court of the state decided that a trial judge had correctly ruled that the period should be computed by including all days except Sundays, holidays, and rainy days. But the decision rested upon the point that such an interpretation of the agreement was in accord with mutual intent of the parties. "Certainly," said the court, "the term '80 working days' . . . has no meaning so fixed that a court, reading the contract in the light of its subject matter and the surrounding circumstances, may not give to the phrase such a reasonable construction as will fairly effectuate the intent of the parties." It appeared that this particular contract had been entered into under a mutual oral understanding that the phrase "working day" should not include rainy days. (Mazzotta v. Bornstein, 133 Atl. 677.)

In general line with the Connecticut court's conclusions are decisions of the appellate courts of Missouri, New York, and Texas.



Lifts 3,000 Pound Load 8 Feet

The "Ottawa" INDUSTRIAL Hydraulic Front-End LOADER is a HEAVY DUTY Machine . . . it lifts 3000 pounds of Sand, Gravel, Rock, Coal, Steel Pipe, Dirt or Other Bulk Materials to a height of 8 feet quickly and easily . . . it assures operator perfectly CLEAR VISION at all times, is quickly and simply ATTACHED or DETACHED and is SHIPPED COMPLETE (there's absolutely nothing additional to buy or add) with complete HYDRAULIC SYSTEM including pump and valve. Bulldozer blade, Snowplow and Boom attachments are available. Write or wire today for FREE ILLUSTRATED FOLDER and prices. Immediate shipment.

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ALLIS-CHALMERS
"WC" with wide front wheels

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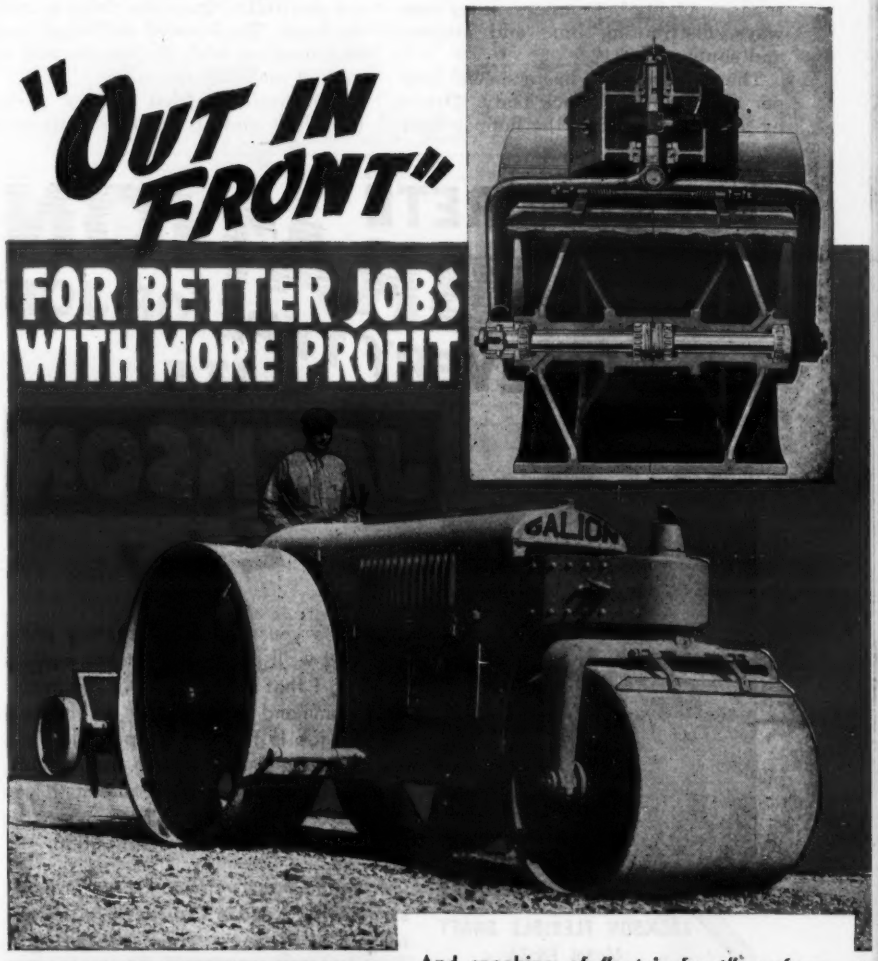
"OUT IN FRONT"
FOR BETTER JOBS WITH MORE PROFIT



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TON SIZES

And speaking of "out-in-front" performance--take a look at the front-end construction of this GALION Three-Wheel Roller, and note these outstanding features that mean ease of handling, economical operation, and long life.

1. Rolls are assembled with only .005 of an inch clearance which is constantly maintained. This "close-fit" retains all the advantages of a single roll while giving the worthwhile advantages of a split roll.
2. Rolls float on four large adjustable tapered Roller Bearings.
3. Mounting of the heavy king pin at top and bottom on Roller Bearings assures easy steering under all road conditions.
4. Yoke is sturdy steel casting heavily reinforced at points of strain.
5. Yoke is connected to heavy forged steel king pin by a swivel joint giving full flexibility.
6. Rolls are made of a special, tough, fine grain cast iron. The heavy steel spokes are securely anchored in rim as it is cast, giving the effect of one-piece construction.

Complete information given in Catalog No. 280. Write for your copy and names of nearest Distributors.

The GALION IRON WORKS & MANUFACTURING CO.
GALION, OHIO

GALION IRON WORKS
GRADERS · ROLLERS

The St. Paul material spreader is designed for mounting on the front end of a truck for year-round maintenance.

Front-End Spreader For Truck Mounting

Year-round duty is said to be possible with a front-end spreader being made by the St. Paul Front End Material Spreader Co. Spreading many kinds of materials, it can be used for winter maintenance, sanding newly oiled roads, applying hot cinders on icy runways, distributing lime and nitrates, and similar work.

The new spreader has a special hopper, mounted on a truck body. Driven by a gasoline engine, the hopper feeds its load to a conveyor slung alongside the cab and truck engine. The conveyor dumps the material into a chute on the front of the truck. A heavy, fluted, 28-inch friction-type distribution disk then spins the materials out over the surface to be covered.

From 25 to 100 yards of sand or chips can be distributed hourly, the manufacturer says, at spread widths ranging from 4 to 20 feet. The hopper capacity varies according to state load limitations. But the average hopper carries from 4 yards of sand to 10 of cinders. Box extensions can be used to increase its capacity. The hopper sides slope at 60 degrees.

A 4-cylinder air-cooled gasoline engine drives the spreader unit. It uses 14 to 22 hp at 1,800 to 2,600 rpm. The engine's speed and special clutch units are controlled from the driving cab of the truck. The 4-speed shift-type transmission gives wide distribution and volume of material spreading.

Electrically welded 10-gage $\frac{3}{16}$-inch iron deck plate is used throughout the spreader. All moving and working parts are completely enclosed. Conveyor belts are 4-ply and 10 inches wide. The engine, front-end catch box, and transfer-box housing are all easily reached for repair or maintenance.

Full details and specifications of the new front-end material spreader can be obtained from the St. Paul Front End Material Spreader Co., 645 University Ave., St. Paul 4, Minn. Say you saw it in C&EMonthly.

High-Pressure Boiler

A portable steel firebox boiler for high-pressure steam installations is produced by the Kewanee Boiler Corp. Built for loads as small as 10 to 44 hp, this boiler, Type K, has one-pass 3-inch tubes. It is described, with specifications, in an illustrated 20-page catalog available from the firm at Kewanee, Ill. Mention this news report when you write.

FOR CONCRETE VIBRATION ON EVERY TYPE OF JOB IT'S JACKSON 2 to 1

You state your concrete vibratory problem, and we'll supply the answer and lay you 2 to 1 that the JACKSON equipment we recommend will not only do the best possible job in the shortest possible time, but will also be the most dependable, trouble-free vibratory equipment you have ever owned. The line covers the entire field of concrete construction.

General Construction · Light Construction · Mass Concrete · Hard-to-get-at Places · Form Vibrating · Floors, Streets and Highways · Pipe Manufacturing · Movement of Materials · Vibratory Tables, etc.

Write for complete information and recommendations or the name of the nearest JACKSON distributor where this equipment may be seen.

JACKSON FLEXIBLE SHAFT Model FS-7A

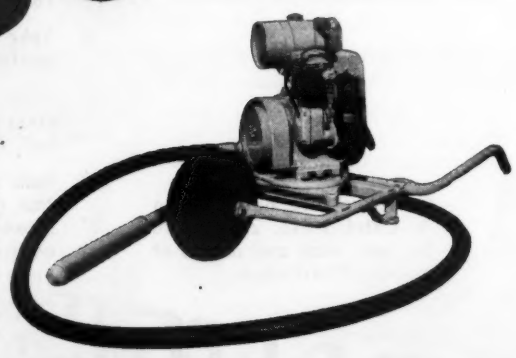
A lightweight, easy-to-handle electric vibrator of wide adaptability. Will handle any of our standard vibrator heads up to 2⅜" x 18⅝" with shafts up to 21' long. Universal motor, 115 volt AC or DC. Frequency 7,000 to 10,000 V.P.M. Available with shaft lengths of 24", 36", 7', 14' and 21'. Skid type handle.

JACKSON HYDRAULIC Model HS-A1

A husky, dependable concrete vibrator for general use. Oil powered, gas engine hydraulic pump drive. 4000 to 7000 V.P.M. Head — 2¾" x 21". Quickly fitted with head for wet or dry rubbing, drilling, etc. Balanced for easy lift. Drop handles for easy hose disposal.

JACKSON FLEXIBLE SHAFT Model FS-6A

A very dependable independent unit, gas engine powered. Up to 7500 V.P.M. 3 heads for thick and thin sections. Flexible shafting in 7 ft. to 14 ft. lengths up to 28 ft. Automatic clutch. Swivel base. Wheel barrow optional. Available with grinding and other attachments.



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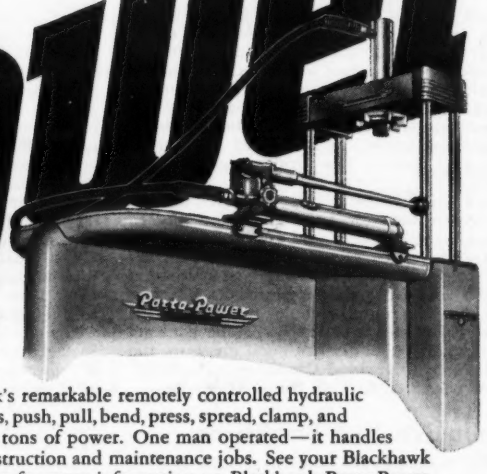
LUDINGTON MICHIGAN

Porto-Power*



2, 4, 7, 10, 20, and 50-ton capacities

Porto-Power, Blackhawk's remarkable remotely controlled hydraulic jack and attachments, push, pull, bend, press, spread, clamp, and straighten with tons of power. One man operated—it handles 1001 rough, tough construction and maintenance jobs. See your Blackhawk Supply Distributor for more information on Blackhawk Porto-Power.

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There is only one Porto-Power*... it is made by

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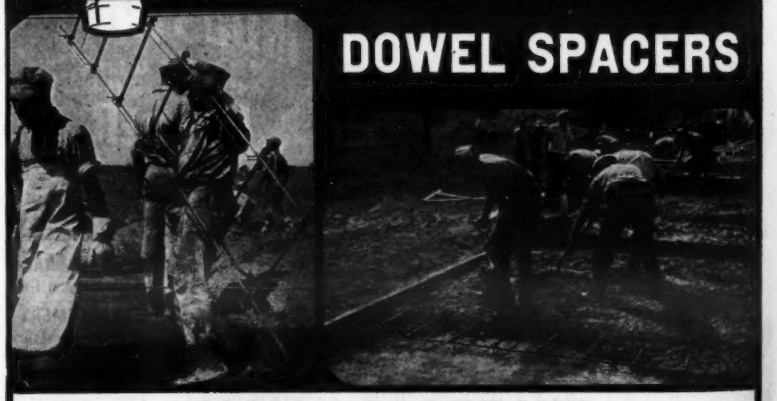
LACLEDE LACLEDE WELDED DOWEL SPACERS



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FOR CONTRACTORS, LACLEDE DOWEL SPACERS provide a light weight, economical method of placing dowels and joints. Distribution bars, supports, and dowel sleeves are all welded into one integral unit for rapid joint assembly. Shaped tie wires accurately locate fibre or steel joint materials.

FOR ENGINEERS, LACLEDE DOWEL SPACERS provide a rigid, accurate, prefabricated assembly for holding each end of each dowel in exact location. Both horizontal and vertical alignment of the dowels can be maintained on even the most irregular subgrades within limits prescribed by highway engineers.

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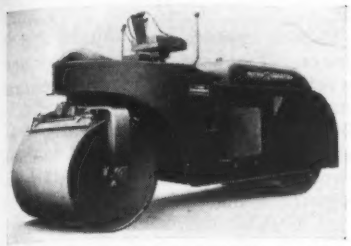


The new Buffalo-Springfield tandem rollers, available in four sizes, are powered by gasoline or diesel engines.

B-S-R Adds 4 Tandems To Its New Roller Line

A new and simplified transmission is featured in a line of tandem rollers just announced by the Buffalo-Springfield Roller Co. The line includes four models, 5 to 8, 6 to 9, 8 to 12, and 10 to 14 tons. It supplements the 3 to 4-ton tandem and the 10 and 12-ton 3-wheel rollers that B-S-R has already announced for 1946.

Powered by either gasoline or diesel engines, the new tandems are streamlined for a more pleasing effect and for greater functional advantage. The capacity of the sprinkler tank has been increased. A cutaway section of the drive-roll hooding is said to give better vision. A removable drive-roll grill has been incorporated for greater accessibility and better appearance.

The engine and transmission controls for the new rollers have been greatly improved, the firm says. The units have a 4-speed forward and reverse transmission. Additional features include a refined hydraulic pump and hydraulic steering circuit, and a further advanced bevel gear-and-pinion final drive.

Complete specifications for these new rollers can be secured on mention of this news story. Write to the firm at Springfield, Ohio.

Special Engine Fan Is Easily Installed

To simplify the installation of its Thermo-Control fan in existing engine mounts, the Evans Products Co. has engineered a new front-operating adapter for the thermal-power element. The fan is installed merely by removing the old one from the engine, and mounting the Thermo-Control unit with the correct mounting flange to fit the hub.

The Evans fan is a variable-pitch self-adjusting unit operated by a built-in thermal power element. It can adjust itself to changes in both engine and ambient temperatures, while maintaining nearly constant engine-operating temperature. The unit is said to reduce fuel, lubrication, and maintenance costs by helping to eliminate nearly all sludge formations in the engine and lubricant.

The Thermo-Control fan is made in 4, 6, and 8-blade models for installation on such heavy-duty equipment as large trucks, generators, pumping units, shovels, tractors, cranes, and mobile and stationary industrial equipment.

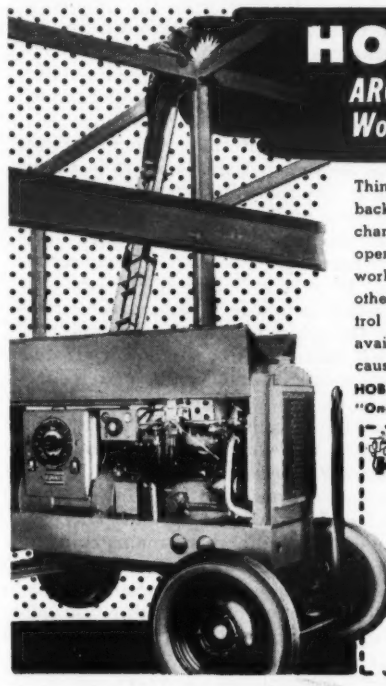
Further details about the Thermo-Control fan and the new special adapter can be obtained by writing the Thermo-Aire Division of Evans Products Co., 15310 Fullerton Ave., Detroit 27, Mich.

Truck-Mounted Machine Shop

All of the equipment ordinarily found in central repair depots is assembled in its new Mobile Machine Shop, the Davey Compressor Co. says. The firm has issued a descriptive folder about this truck-mounted shop.

The "basic three" power units are a 60-cfm compressor, a 300-ampere welding generator, and a 5-kw power generator. These are powered by a heavy-duty power take-off inserted in the drive shaft of the truck. Almost any combination of tools and equipment can be included and arranged in the shop.

Organizations interested in the Davey Mobile Machine Shop should write to the Truck Equipment Division, Davey Compressor Co., No. Water St., Kent, Ohio. Form E-208 is available on mention of this notice.



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C. & E. M. Photo

A timber crib wall was erected on the east side of the excavation to prevent a cave-in and to protect the water main which supplies the hospital.

Foundation

(*Continued from page 6*)

rangers, supported by lateral pressure and by 6-foot lengths of 2 x 6's nailed to the sheeting beneath the rangers. No shoring or bracing was required once the rock was reached.

After the shaft was completed, a very heavy rain caused about 12 feet of water to collect at the bottom of the deep hole. Some of this was removed with the concrete bucket, but it was a slow operation and an Ingersoll-Rand No. 25 air pump was dropped into the shaft. The pump worked from the compressor on ¾-inch inlet and exhaust air lines, and forced the water out through more than 50 feet of 2½-inch discharge line into a catch basin and thence to the city sewer system.

Tunnel and Manhole

From the bottom of the shaft a tunnel, 5½ feet high x 5 feet wide, was blasted 40 feet through solid rock to meet the city interceptor sewer. Blast holes were drilled 4 feet deep, one at the center of the tunnel and five equally spaced around a 2-foot-radius circle drawn from the center. After the blast, the rock was loosened by picks and shovels, loaded into a wheelbarrow, and brought back to the foot of the shaft where it was transferred to the concrete bucket and pulled to the top. Since the tunnel was entirely through rock, no bracing was necessary.

A 30-inch concrete sewer pipe was then laid on the bottom of the tunnel, beginning at the connection to the city system and working back towards the shaft. The area between the pipe and the inside of the tunnel was lined with rubble concrete and chunks of rock that had been blasted from the tunnel or shaft. Concrete was lowered in the bucket to the 4-man crew. They shoveled it into the lining opening along with pieces of rock which were rammed in place with sections of 2 x 4's.

In the 52-foot shaft a manhole was then constructed, the lower 25 feet having a 3½-foot diameter and 12-inch concrete walls. When this much was done the structure was backfilled up to that point. Then a concrete weir chamber, 10 x 4 x 7 feet high, was constructed at that level. Above the chamber the upper part of the manhole is of brick construction; its lower 13-foot section has 12-inch walls, and the remaining upper section to street level has 8-inch walls.

From the weir chamber two sewer lines, a 21-inch sanitary and an 18-inch storm, run south 100 feet at a depth of 25 feet to another manhole. There an angle is turned and the mains continue another 100 feet to tie in with the new hospital High Building. For the last 100-foot section to the building the construction was open cut since nothing was in the way. For the 100-foot stretch between manholes, however, sheeting had to be driven, since a service road was on one side of the trench and a water main and electric conduit on the other side.

The air hammer drove the rows of 2 x 6, 2 x 8, or 2 x 10-inch wooden sheeting. The trench between them measured 8 feet 8 inches and was 25 feet long. The crane and clamshell bucket did the excavation after Ingersoll-Rand pneumatic spades had broken up some tough strata of hardpan. Longitudinal bracing consisted of 8 x 8-inch rangers, 18 to 20 feet long. They were spaced 3 feet vertically on centers, with other 8 x 8's for cross bracing at 8 or 9-foot intervals. For added support 2 x 8's were nailed on top of these cross braces and lapped over the top of the longitudinal rangers.

Concrete Footings and Walls

An International TD-14 tractor and a Bucyrus-Erie blade shaped the bottom of the excavation to grade in preparation for the construction of footings and foundation walls. The footings, 172 in number, range in size from 3 feet square to the large 6 x 7-foot foundations for the main columns. They vary in depth from 2½ to 4 feet, all resting on rock. The compressor-driven pneumatic spades completed whatever excavation remained for the footings, and the wood forms were then built. As a rule 1 x 8 stock was used, braced with 2 x 4 studs on 24-inch centers and double 2 x 4 wales on 3-foot centers. Form work and concreting were done by the general contractor, the George A. Fuller Co.

Forms for the foundation walls were made from 4 x 8-foot panels of ⅝-inch plywood, split into 2 x 8-foot sections by

(*Concluded on next page*)

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Look for this Mark of STERLING Quality
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Foundation

(Continued from preceding page)

a 12-inch table saw. Bracing consisted of 2 x 4 studs on 16-inch centers, and double 2 x 4 wales on 24-inch centers; Richmond Screw Anchor tie rods were also set at the latter spacing. The wall forms were erected on concrete leveling pads, 20 inches wide and from 3 to 6 inches deep, as an added refinement to insure perfect line and grade. The 24-foot-high walls are 12 inches thick on three sides, and 16 inches thick on the west side where steel framing is supported. While the footings contain no steel reinforcement, the walls have steel in both faces.

The Edward Balf Co. of Hartford furnished ready-mixed concrete both for the manholes and drainage structures on the subcontract, and for the footings and walls on the main contract. Four Rex 4-yard mixers mounted on Mack trucks hauled the concrete ½ mile in about 10 minutes from the plant to the job site. There it was chuted into the forms and vibrated. The mix developed a 3,000-pound strength in 28 days. The aggregate in the footings was graded from 1½ inch down, while that used in the walls had a maximum size of ¾ inch. To make the walls waterproof, 10 per cent by weight of lime was added to the mix.

In order to set the steel reinforcing in these 24-foot-high walls, scaffolds were built about 7 feet off the ground on the inside of the walls. From this point the lower-half reinforcing was easily set. For the upper half of the wall the steel was set from scaffolds on the other side at a much higher elevation. Knee braces, 2 x 6, were set about every 8 feet from the bank to a line of wales as a support for planks stretched between them.

Personnel

About 60 men were employed on the excavation subcontract done by E. B. McGurk, Inc., of Hartford, with Joseph Ferrigno as Superintendent. Eddie Spera, veteran foreman, looked after the sewer work. This contractor had an Alemite portable service station mounted on an International truck with which equipment was greased during the lunch hour. On the greasing rig were hose reels for gear oil, air, chassis lubricant, motor oil, and transmission grease.

The George A. Fuller Co. of New York is represented by M. J. Grogan, Superintendent, and L. J. Redding, Assistant Superintendent, with a force of about 45 working on the concrete foundation pours.

The new High Building of the Hartford Hospital was designed by the Boston architectural firm of Coolidge, Shepley, Bulfinch & Abbott. Representing the firm at the job site is Resident Engineer W. M. Chance, Jr., as Clerk of the Works.

To eliminate the noise of riveting hammers during the steel erection this year, the structure will be welded. This will be a boon to patients at the hospital. The exterior of the building will have 4-inch glazed manganese-spotted face bricks backed by sand-lime common brick. It is expected that the new 180 x 320-foot High Building will be completed and ready for occupancy some time in 1947.

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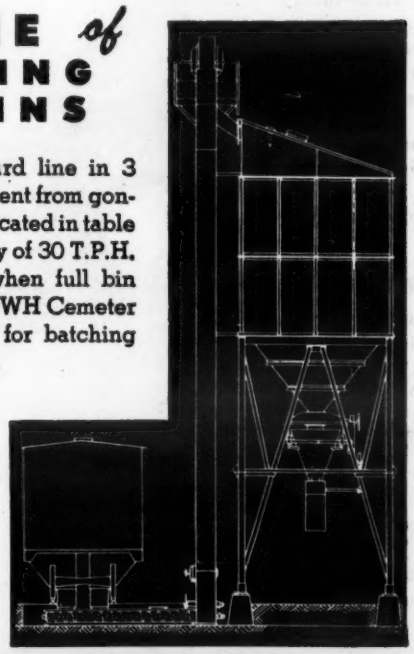

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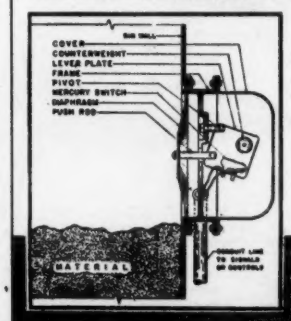

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COST CUTTING METHOD *used to supply* KINGSLEY DAM GRAVEL PLANT

Tournapull dumps from trestle through grizzly to conveyor.

3 TOURNAPULLS strip gravel pockets . . . then same rigs load out sand and gravel, dump to conveyor and haul away sand in one cycle of operation

Tobin Quarries of Kansas City took contract to produce ¼" to 2½" gravel for filter face under rip-rap to prevent washing at Kingsley Dam near Ogallala, Nebraska. 2 square miles pit area of sand and clay hills carried spotty gravel formation from 2 to 10' deep with large percentage of sand.

Tournapulls were selected to load and haul from pit to plant because of their high-speed, low-cost production and ability to combine stripping, loading and hauling operations in selective mining of the gravel formation. These fast rubber-tired rigs strip the knolls, then load gravel mixture and haul to grizzly, dump onto conveyor belt which feeds plant. Screened gravel is bin-loaded to trucks for haul to dam face. Tournapulls pull around under hopper, are loaded with waste sand, haul this back and dump in mined-out area.

Haul loaded both ways, make 4000-foot cycle in 11½ minutes

Tournapulls are making round trip haul of 4000 ft. in 11½ minutes, hauling pit run gravel to plant, returning with waste sand to pit. They are pusher loaded in 1 minute; haul 2000' to plant, half of it up-grade, in 3¼ minutes. Dumping to grizzly takes ¾ minute; loading waste sand from hopper 1¾ minutes; hauling and dumping sand 2¾ minutes; return to pit 2 minutes.

Tournapulls saved 8 minutes per trip

Early in the job, Tobin Quarries compared Tournapull production with crawler-drawn scrapers . . . found a Tournapull made round trips in 10 minutes compared to 18 minutes for the crawler tractors and scrapers. Because of this 8 minutes saved per trip, with resulting increased production, 2 additional rubber-tired, high-speed Tournapulls were brought onto the job. The 3 Tournapulls now supply enough material to keep the 200-ton-per-hour screening plant in continuous operation.

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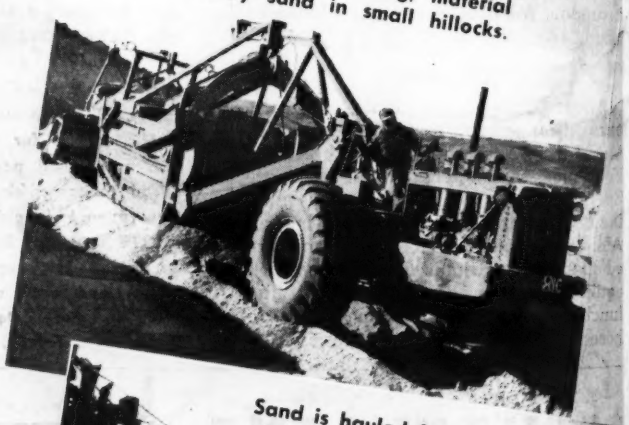
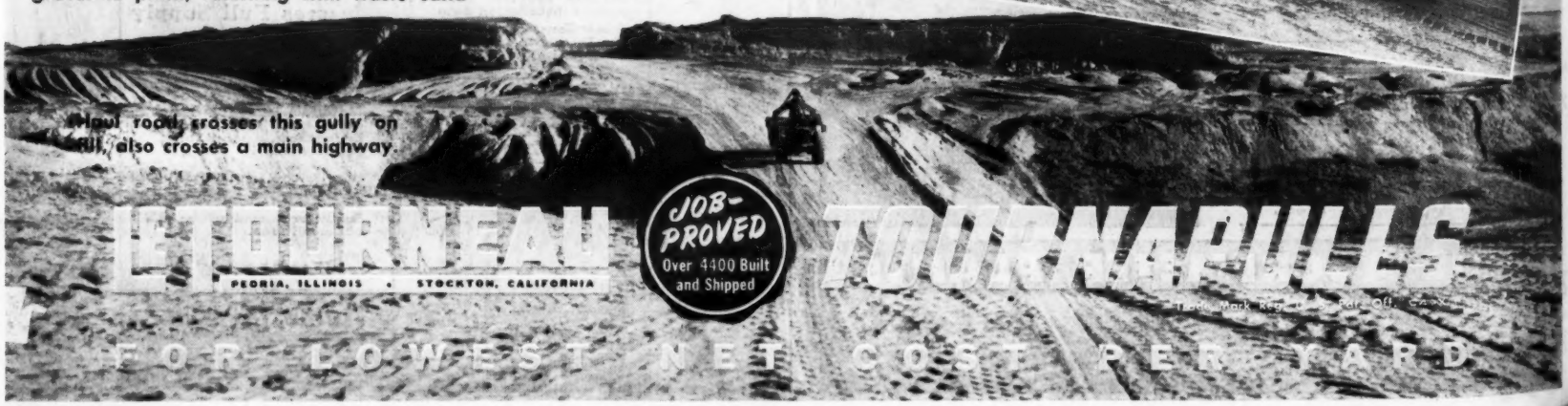
Pit is tough loading; material mostly sand in small hillocks.



Sand is hauled from hopper to waste area in pit and dumped.

Haul road crosses this gully on fill, also crosses a main highway.



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